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Governing Artificial Intelligence: The Role of International Trade Law

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Abstract

Artificial intelligence (AI), which is projected to become the dominant technology in the decades to come, lies at the heart of the Fourth Industrial Revolution, the digital transformation that has had a profound impact on the development, production, consumption, and trade of goods and services in the XXI century.

Inserting itself in the macro-debate on digital trade regulation and the treatment of emerging technologies under international economic law, this study focuses on a rather unexplored area in this field of law: the relationship between AI governance and international trade law. This research stems from the observation that, in response to the recent surge in AI applications, governments have started to adopt a patchwork of measures relevant to artificial intelligence that may affect the international supply and consumption of goods and services that rely on this technology.

Acknowledging the key role that services play in the digital economy and recognising that AI may impact both services and services suppliers, this study focuses on AI-powered services to explore the role that international trade law can play in shaping AI governance. More specifically, it investigates the extent to which international trade agreements pose limits to the ability of governments to adopt AI-specific measures that can affect trade in services, and contributes to the establishment of AI governance frameworks. It does so by addressing four key issues: the nature and relevance of AI governance measures for trade in services; the impact of AI on the applicability of GATS disciplines; the potential limitations posed on AI governance by GATS obligations and commitments; and the relevance of new rules on digital trade in PTAs for AI governance.

The research shows that AI is a peculiar digital technology that involves a strong link between cognitive capabilities and computer programs, and a combination of decades old theoretical concepts with new methods and practical applications. These features contribute to creating a certain degree of uncertainty regarding the applicability of multilateral rules on trade in services negotiated in the early 1990s.

The study also reveals that governments' approach to AI has changed remarkably since the founding of the WTO, with the period 1995-2015 characterised primarily by the adoption of policies that affect all digital technologies, including AI, and the period post-2015 defined by the introduction of policies that target AI explicitly and exclusively, such as AI ethical principles, AI standards, and AI-specific subsidies.

While most scholarly work has already focused on the analysis of AI-related measures, this study focuses on AI-specific policies to assess the relationship between AI governance and international trade law. The study shows that, to the extent that a Member's AI-specific policy is a measure affecting trade in services, it would fall under the purview of the GATS and be subject to its general obligations and specific commitments. However, a few factors may influence the scope and strength of the boundaries set by the GATS on AI governance, including the type of policy adopted, the entity implementing the policy, the rationale behind its design and application, the classification of AI-powered services, and the potential impact of AI on modes of supply and on the concept of likeness. The analysis also shows that digital trade rules emerging in PTAs can also contribute to shaping AI governance.

Besides finding that international trade law can contribute to govern AI, this research also reveals that Al's disruptive nature may likewise influence international trade law moving forward, as it forces governments to reconsider the extent to which existing rules can keep up with technological progress, to evaluate the need for new disciplines that take into account the peculiar nature of Al, and to rethink the role of the WTO in the AI era.

To my husband, Matteo

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List of Abbreviations

AB	Appellate Body
AGI	Artificial General Intelligence
AI	Artificial Intelligence
AIaaS	Artificial Intelligence as a Service
AIGO	OECD Expert Group on AI
AIIA	Artificial Intelligence Industry Alliance
ALATs	Automated Legal Advice Tools
APEC	Asia-Pacific Economic Cooperation
APP	Australian Privacy Principles
ASICs	Application-Specific Integrated Circuits
BCR	Binding Corporate Rules
CAFTA	Comprehensive Free Trade Agreement with the European Union
CBPR	Cross-Border Privacy Rules
CETA	Comprehensive Economic and Trade Agreement
CPC	Central Product Classification
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CPUs	Central Processing Units
CSC	Committee on Specific Commitments
CTD	Committee on Trade and Development
CTG	Council for Trade in Goods
CTS	Council for Trade in Services
DDA	Doha Development Agenda
DEA	Digital Economy Agreement
DEPA	Digital Economy Partnership Agreement
DESTA	Design of Trade Agreements
DL	Deep Learning
DPA	Digital Partnership Agreement
DTA	Digital Trade Agreement
DTRI	Digital Trade Restrictiveness Index
EEC	European Communities
ECIPE	European Centre for International Political Economy
EHRs	Electronic Health Records
E.O.	Executive Order
EPA	Economic Partnership Agreement
EU	European Union

FLI	The Future of Life Institute
FPGAs	Field Programmable Gate Arrays
FSB	Federal Security Service
FTA	Free Trade Agreement
GA	Global Agreement
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GGFs	Government Guiding Funds
GPA	Government Procurement Agreement
GPAI	Global Partnership on Artificial Intelligence
GPUs	Graphics Processing Units
HFT	High Frequency Trading
ICT	Information and Communications Technology
IEC	International Elecrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IoT	Internet of Things
IP	Intellectual Property
ISO	International Organization for Standardization
ISPs	Internet Service Providers
IT	Information Technology
ITA	Information Technology Agreement
ITS	Intelligent Tutoring Systems
ITU	International Telecommunications Union
JI	Joint Initiative
JTC	Joint Technical Committee
LDCs	Least-Developed Countries
MA	Market Access
MC	Ministerial Conference
MFN	Most Favoured Nation
ML	Machine Learning
MOST	Ministry of Science and Technology
MSMEs	Micro, Small and Medium-sized Enterprises
NAIIA	National Artificial Intelligence Initiative Act
NGOs	Non-Governmental Organizations
NIST	National Institute of Standards and Technology
NITI	National Institution for Transforming India

NLP	Natural Language Processing
NSB	National Standardisation Body
NSCAI	National Security Commission on Artificial Intelligence
NT	National Treatment
OECD	Organization for Economic Cooperation and Development
PDPA	Personal Data Protection Act
PRP	Privacy Recognition for Processors
PTAs	Preferential Trade Agreements
R&D	Research and Development
RCEP	Regional Comprehensive Economic Partnership
RoO	Rules of Origin
RTAs	Regional Trade Agreements
SAC	Standardization Administration of China
SAFTA	Singapore-Australia Free Trade Agreement
SC	Sub-Committee
SCM	Subsidies and Countervailing Measures
SDGs	Sustainable Development Goals
SDR	Services Domestic Regulation
SMEs	Small and Medium-sized Enterprises
SPS	Sanitary and Phytosanitary
TBT	Technical Barriers to Trade
TCA	Trade and Cooperation Agreement
TFEU	Treaty on the Functioning of the European Union
TRIPS	Trade-Relates aspects of Intellectual Property Rights
UK	United Kingdom
USMCA	United States-Mexico-Canada Agreement
UN	United Nations
UNICRI	United Nations Interregional Crime and Justice Research Institute
US	United States of America
VCLT	Vienna Convention on the Law of Treaties
WPDR	Working Party on Domestic Regulation
WPGR	Working Party on GATS Rules
WPPS	Working Party on Professional Services
WTO	World Trade Organization

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1 Chapter – Introduction

1.1 Artificial Intelligence and the Fourth Industrial Revolution

Recent data-driven technological innovations and breakthroughs have had a profound impact on how goods and services are developed, produced, traded across borders, distributed, and consumed, translating into a considerable level of legal and policy uncertainty about the World Trade Organization (WTO) regulatory framework established decades ago.

Schwab defined these period of digital transformation in the XXI century as the Fourth Industrial Revolution, characterized by more ubiquitous and mobile Internet, smaller and more powerful sensors that have become cheaper and more sophisticated, and integrated digital technologies that can transform societies and the global economy.[1] Brynjolfsson and McAfee refer to this period as 'the second machine age', characterized by astonishing progress with digital technologies whose importance and transformational impact on society and the economy is comparable to that of the steam engine.[2]

At the heart of this digital revolution is artificial intelligence (AI), which is projected to become the dominant technology in the decades to come. According to Brynjolfsson and McAfee, the exponential, digital, and recombinant powers of the second machine age have led to the creation of one of the most important one-time events in history, namely the emergence of real, useful AI.[3] Skilton and Hovsepian opine that AI has become a critical technological change for the Fourth Industrial Revolution.[4] Other

[1] Klaus Schwab, *The Fourth Industrial Revolution* (Portfolio Penguin 2017) 7.
[2] Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (W W Norton & Company 2014) 9.
[3] ibid 90.
[4] Mark Skilton and Felix Hovsepian, *The 4th Industrial Revolution: Responding to the Impact of Artificial Intelligence on Business* (Palgrave Macmillan 2018) 34.

consider AI a "general-purpose technology" with a multitude of applications that could have more profound implications for humanity than fire or electricity.[5]

MarketsandMarkets projects that the global AI market size will grow from USD 58.3 billion in 2021 to USD 309.6 billion by 2026.[6] Consulting firm PwC predicts a USD 15.7 trillion global economic growth by 2030 provided by AI.[7] It also projects that financial services, healthcare, technology communications and entertainment, as well as transport and logistics will provide the greatest opportunity for AI in the services sector.[8] China and North America, who are leading the AI race, stand to see the biggest economic gains, as AI is expected to enhance their gross domestic product (GDP) by 26.1 and 14.5, respectively, and the two countries are projected to account for a total of USD 10.7 trillion and 70% of the global economic impact.[9] However, developing countries are likely to experience more modest increases due to the expected much lower rate of adoption of AI technology.[10]

1.2 Artificial Intelligence and International Trade Law: A Literature Review

Poised to unleash the next wave of digital disruption, AI promises benefits whilst also posing urgent challenges that cut across firms, developers, government, and workers.[11] Indeed, Al elicits conflicting sentiments. On the one hand, there are

[5] Michael C Horowitz, 'Artificial Intelligence, International Competition, and the Balance of Power (May 2018)' (2018) 1 Texas National Security Review 36, 39; Anthony Cuthbertson, 'Artificial Intelligence Is as Important as Fire—and as Dangerous, Says Google Boss' (*Newsweek*, 22 January 2018) <https://www.newsweek.com/artificial-intelligence-more-profound-electricity-or-fire-says-google-boss-786531> accessed 29 November 2021.

[6] MarketsandMarkets, 'Artificial Intelligence (AI) Market Worth $309.6 Billion by 2026' (*MarketsandMarkets*, May 2021) <https://www.marketsandmarkets.com/PressReleases/artificial-intelligence.asp%20.asp> accessed 29 November 2021.

[7] PwC, 'Sizing the Prize - PwC's Global Artificial Intelligence Study: Exploiting the AI Revolution' (*PwC*, 2017) 3 <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html> accessed 29 November 2021.

[8] PwC (n 7).

[9] ibid 7.

[10] PwC (n 7).

[11] Jacques Bughin and others, 'Artificial Intelligence: The Next Digital Frontier' (McKinsey Global Institute 2017) 4.

concerns about its impact on employment and jobs[12], its intrusiveness on privacy[13], its use for military purposes[14], and the risk it may represent for human rights[15]. Others view it as a powerful tool to solve some of the most pressing and challenging world problems.[16] To many companies Al technologies offer the opportunity to significantly reduce production costs and increase productivity.[17] For most governments AI could be the key to unleash unprecedented economic growth. However, some fear that this technology and the brewing battle for leadership in its development could also contribute to increasing the digital divide both within and across countries.[18]

The increased use of Al has raised concerns across many areas of law, depending on the nature of the interest affected by its deployment.[19] For example, under tort law scholars have discussed the liability for any wrongful act committed by Al machines, including robots and autonomous vehicles.[20] Intellectual property rights experts have

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[12] Dana Remus and Frank Levy, 'Can Robots Be Lawyers: Computers, Lawyers, and the Practice of Law 30th Anniversary Commemorative Issue' (2017) 30 Georgetown Journal of Legal Ethics 501; Pegah Moradi and Karen Levy, 'The Future of Work in the Age of AI' in Markus D Dubber, Frank Pasquale and Sunita Das (eds), *The Oxford Handbook of Ethics of AI* (Oxford University Press 2020).

[13] Karl Manheim and Lyric Kaplan, 'Artificial Intelligence: Risks to Privacy and Democracy' 21 Yale Journal of Law & Technology 106; Chen Yufei and others, 'Security and Privacy Risks in Artificial Intelligence Systems' (2019) 56 Journal of Computer Research and Development 2135; Sunitha Abhay Jain and Simran A Jain, 'Artificial Intelligence: A Threat to Privacy' (2018) 8 Nirma University Law Journal 21.

[14] James Johnson, 'Artificial Intelligence & Future Warfare: Implications for International Security' (2019) 35 Defense & Security Analysis 147; Melanie Sisson and others, 'Perspectives on the Militarization of Artificial Intelligence (AI)' (Stanley Center for Peace and Security 2020) <https://stanleycenter.org/publications/militarization-of-artificial-intelligence/> accessed 11 November 2021.

[15] Filippo A Raso and others, 'Artificial Intelligence & Human Rights: Opportunities & Risks' (2018) Berkman Klein Center Research Publication No. 2018-6 <https://ssrn.com/abstract=3259344> accessed 11 November 2021; Eileen Donahoe and Megan MacDuffee Metzger, 'Artificial Intelligence and Human Rights' (2019) 30 Journal of Democracy 115.

[16] David Rolnick and others, 'Tackling Climate Change with Machine Learning' [2019] arXiv:1906.05433; Jpseph Bennington-Castro, 'AI Is a Game-Changer in the Fight against Hunger and Poverty. Here's Why' (*NBC News*, 21 June 2017) <https://www.nbcnews.com/mach/tech/ai-game-changer-fight-against-hunger-poverty-here-s-why-ncna774696> accessed 11 November 2021.

[17] Bughin and others (n 11).

[18] Cristian Alonso, Siddharth Kothari and Rehman Sidra, 'How Artificial Intelligence Could Widen the Gap Between Rich and Poor Nations' (*IMF Blog*, 20 December 2020) <https://blogs.imf.org/2020/12/02/how-artificial-intelligence-could-widen-the-gap-between-rich-and-poor-nations/> accessed 11 November 2021.

[19] Joe Cannataci, Valeria Falce and Oreste Pollicino, 'Introduction - New Legal Challenges of Big Data' in Joe Cannataci, Valeria Falce and Oreste Pollicino (eds), *Legal Challenges of Big Data* (Edward Elgar Publishing 2020) 305.

[20] Omri Rachum-Twaig, 'Whose Robot Is It Anyway?: Liability for Artificial-Intelligence-Based Robots' (2020) 2020 University of Illinois Law Review 1141; David C Vladeck, 'Machines without Principals: Liability Rules and Artificial Intelligence Essay' (2014) 89 Washington Law Review 117; Paulius Čerka,

debated, among others, whether copyright coverage should be extended also to materials, lyrics or books created by AI machines.[21] Under privacy law scholars have pondered how to best ensure personal data and privacy can be protected from mismanagement and abuse by AI systems.[22]

Scholars in international trade law have also addressed AI. However, they tend to conflate it with all the other digital technologies when discussing the impact of technological progress on WTO law, since AI shares some common traits (e.g., reliance on data, need to protect software intellectual property) and has, to some extent, a rapport of interdependence with other technologies underpinning the digital economy (e.g., cloud computing and Internet of Things (IoT)). Discussions on trade regulation in the digital era focus primarily on whether and to what extent the emergence of new technologies, including AI, renders the existing multilateral trade rulebook obsolete and in need of an updating[23]; how the cross-border flow of data, a key input for the functioning of AI systems, should be regulated[24]; how digital products, including those powered by AI, should be classified[25]; and the scope of application of general and security exceptions[26].

Jurgita Grigienė and Gintarė Sirbikytė, 'Liability for Damages Caused by Artificial Intelligence' (2015) 31 Computer Law & Security Review 376.

[21] Kalin Hristov, 'Artificial Intelligence and the Copyright Dilemma' (2016) 57 IDEA: The Journal of the Franklin Pierce Center for Intellectual Property 431; Jani Ihalainen, 'Computer Creativity: Artificial Intelligence and Copyright' (2018) 13 Journal of Intellectual Property Law & Practice 724.

[22] Matt Bartlett, 'Beyond Privacy: Protecting Data Interests in the Age of Artificial Intelligence' (2021) 3 Law, Technology and Humans 96; Ryan Calo, 'Peeping HALs: Making Sense of Artificial Intelligence and Privacy' (2008) 2 European Journal of Legal Studies 168; Francesca Lagioia and Giovanni Sartor, 'Artificial Intelligence in the Big Data Era: Risks and Opportunities' in Joe Cannataci, Valeria Falce and Oreste Pollicino (eds), *Legal Challenges of Big Data* (Edward Elgar Publishing 2020).

[23] Joshua P Meltzer, 'Governing Digital Trade' (2019) 18 World Trade Review S23.

[24] Susan Ariel Aaronson and Patrick Leblond, 'Another Digital Divide: The Rise of Data Realms and Its Implications for the WTO' (2018) 21 Journal of International Economic Law 245; Nivedita Sen, 'Understanding the Role of the WTO in International Data Flows: Taking the Liberalization or the Regulatory Autonomy Path?' (2018) 21 Journal of International Economic Law 323.

[25] Sam Fleuter, 'The Role of Digital Products Under the WTO: A New Framework for GATT and GATS Classification' (2016) 17 Chicago Journal of International Law; Ines Willemyns, 'GATS Classification of Digital Services: Does The Cloud Have a Silver Lining?' (2019) 53 Journal of World Trade 59; Stewart A Baker and others, 'E-Products and the WTO' (2001) 35 The International Lawyer 5.

[26] Martina Francesca Ferracane, 'Data Flows and National Security: A Conceptual Framework to Assess Restrictions on Data Flows under GATS Security Exception' (2018) 21 Digital Policy, Regulation and Governance 44; Robert Wolfe, 'Learning about Digital Trade: Privacy and E-Commerce in CETA and TPP' (2019) 18 World Trade Review S63.

Although some studies on AI regulation do not consider international trade law as relevant[27], a few scholars in this field have recently started to focus their analysis on AI and its relationship with global trade governance.[28] While some authors took a more comprehensive approach[29], others limited their analysis to individual or groups of countries. For example, Irion and Williamson focused on the European Union (EU), arguing in favour of a reconciliation between domestic rulemaking in AI and the EU external trade policy, which should preserve the regulatory space for domestic measures targeting AI.[30] Aaronson, on the other hand, examined a representative sample of Asia-Pacific countries to assess how data governance at domestic and international level matters for AI.[31]

Other studies focused on sectors, specific issue areas, or key aspects of the functioning of artificial intelligence and their treatment under international trade law. Chander, for instance, used two hypothetical cases in the health sector (i.e. medical diagnostic AI-based system) and financial services (i.e. insurance coverage decision-making AI) to discuss the applicability of the rules of the General Agreement on Trade in Services (GATS) to AI.[32] Liu and Lin examined the complex relationship between AI and trade through four issue areas (automated legal advice tools (ALATs), automated driving systems, computer-generated works, and automated decision-making processes), advocating for a pluralist agenda that could allow the WTO to remain relevant in

[27] Thomas Wischmeyer and Timo Rademacher (eds), *Regulating Artificial Intelligence* (Springer International Publishing 2020) <https://www.springer.com/gp/book/9783030323608> accessed 25 October 2020; Marcelo Corrales Compagnucci, Mark Fenwick and Nikolaus Forgó (eds), *Robotics, AI and the Future of Law* (Springer Singapore 2018).

[28] Most of these studies were published when this research was already underway.

[29] Shin-Yi Peng, Lin, Ching-Fu and Thomas Streinz, 'Artificial Intelligence and International Economic Law: A Research and Policy Agenda' in Shin-Yi Peng, Lin, Ching-Fu and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law: Disruption, Regulation and Reconfiguration* (Cambridge University Press 2021).

[30] Kristina Irion and Josephine Williams, 'Prospective Policy Study on Artificial Intelligence and EU Trade Policy' (The Institute for Information Law 2019).

[31] Susan Ariel Aaronson, 'Data Governance, AI, and Trade: Asia as a Case Study' (The George Washington University, Institute for International Economic Policy 2020) Working Papers 2020-6 <https://ideas.repec.org/p/gwi/wpaper/2020-6.html> accessed 15 October 2021.

[32] Anupam Chander, 'Artificial Intelligence and Trade' in Mira Burri (ed), *Big Data and Global Trade Law* (Cambridge University Press 2021).

addressing AI-related trade issues moving forward.[33] Irion, on the other hand, focused on the emergence of disciplines on source code and their impact on the EU's right to regulate in the field of AI governance.[34] Several scholars concentrated their attention on the dependence of AI on data and their regulation in international trade law.[35] Additional scholarly work centred around the treatment of artificial intelligence in preferential trade agreements (PTAs)[36], the classification of AI-powered products and their coverage under WTO agreements[37], and the potential AI-regulatory issues that are likely to impact trade policy[38].

1.3 Research question and scope of the thesis

This research stems from the observation that, to a certain extent, the interface between international trade law and AI governance, characterised as the devising of "global norms, policies, and institutions to best ensure the beneficial development and use of advanced AI"[39] and the "variety of tools, solutions, and levers that influence AI development and applications"[40], is a rather unexplored area in the field of international economic law. In an effort to capitalize on AI development to boost their economic profile, prevent technological progress from furthering the digital divide, or minimise the risks associated with the use of AI, governments have started to adopt a

[33] Liu, Han-Wei and Lin, Ching-Fu, 'Artificial Intelligence and Global Trade Governance: A Pluralist Agenda' (2020) 61 Harvard International Law Journal 407, 450.
[34] Kristina Irion, 'AI Regulation in the European Union and Trade Law: How Can Accountability of AI and a High Level of Consumer Protection Prevail over a Trade Discipline on Source Code?' (University of Amsterdam 2021) 14.
[35] Susan Ariel Aaronson, 'Data Minefield? How AI Is Prodding Governments to Rethink Trade in Data' (George Washington University 2018) IIEP-WP-2018-11; Aaronson, 'Data Governance, AI, and Trade: Asia as a Case Study' (n 31); Neha Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (2021) 53 New York University Journal of International Law and Policy; Thomas Streinz, 'International Economic Laws' Regulation of Data as a Resource for the AI Economy' in Shin-Yi Peng, Lin, Ching-Fu and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law: Disruption, Regulation and Reconfiguration* (Cambridge University Press 2021).
[36] Hosuk Lee-Makiyama, 'Briefing Note: AI & Trade Policy', *Tallin Digital Summit* (2018).
[37] Lei Zhang and Kelly K Shang, 'The WTO Disciplines and Trade in Products Powered by Artificial Intelligence: Old Wine and New Wine-Skin?' (2019) 12 Journal of East Asia and International Law 31.
[38] Avi Goldfarb and Daniel Trefler, 'Artificial Intelligence and International Trade', *The Economics of Artificial Intelligence* (The University of Chicago Press 2018) 481–488.
[39] Allan Dafoe, 'AI Governance: A Research Agenda' (Future of Humanity Institute, University of Oxford 2018) 1.
[40] James Butcher and Irakli Beridze, 'What Is the State of Artificial Intelligence Governance Globally?' (2019) 164 The RUSI Journal 88, 88.

wide array of measures that, directly or indirectly, affect trade in digital products, including the cross-border supply and consumption of AI-dependent goods and services.[41] These measures fall into two categories: (i) those that, albeit relevant to all technologies employed in the digital era, could significantly impact AI applications because they affect key aspects of the functioning of this technology, such as data, algorithms and computing power (i.e. AI-related measures); and (ii) those explicitly designed to influence the development and use of artificial intelligence (i.e. AI-specific policies). The former, which include data localization requirements, cybersecurity laws, forced transfers of source code software conditional on market access, data storage requirements, and regulations on data and privacy protection, have been adopted since the mid-1990s, early 2000s.[42] The latter, which include AI national policies, ethical principles, and AI-specific standards, started to appear in the 2010s and are, for the most part, in the infancy stage of development. Unsurprisingly, while scholars and policy makers have focused their attention primarily on AI-related measures, existing literature on AI-specific policies is still rather limited.[43]

Moreover, this research originates from the observation that, although several scholars opine that international trade law likely covers trade in digital services, including those powered by AI,[44] existing literature has fallen short of providing an extensive analysis of the impact of artificial intelligence on the applicability of GATS disciplines and the role that international trade law may play in the design and implementation of AI-specific measures that may affect trade in AI-powered services.

Attempting to fill this gap in literature, this study aims to explore the role that international trade law can play in AI governance from a services' perspective. More specifically, this research aims to investigate whether and to what extent international trade agreements pose limits to the ability of governments to adopt AI-specific

[41] Aaronson, 'Data Minefield? How AI Is Prodding Governments to Rethink Trade in Data' (n 35).
[42] Martina Ferracane, Hosuk Lee-Makiyama and Eric van der Marel, 'Digital Trade Restrictiveness Index' (ECIPE 2018).
[43] For an analysis of the interface between international trade and the promotion of ethical use of data-driven technologies, including AI, see Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35).
[44] Irion and Williams (n 30) 3; Chander (n 32) 117; Zhang and Shang (n 37) 41; Willemyns (n 25) 60.

measures that can affect trade in services, and whether and to what extent international trade law may contribute to the establishment of AI governance frameworks. It will do so by addressing four key issues: (i) the relevance of AI governance measures for trade in services; (ii) the impact of AI on the applicability of GATS disciplines; (iii) the nature of the potential limitations posed on AI governance by GATS obligations and commitments; and (iv) the relevance of new rules on digital trade in PTAs for AI governance.

Several factors influenced the decision to narrow to scope of the research to artificial intelligence and its application in the services sector. First, whilst this study acknowledges that AI coexists in synergy and has an interdependent relationship with other advanced digital technologies[45] and that concerns remain about the classification of digital products under the traditional WTO goods/services dichotomy[46], focusing on one specific technology (AI) and one specific economy sector (services) allows for a deeper analysis and the identification of key issues that may be relevant to that technology and economy sector alone, which more generalist approaches may instead (inadvertently) overlook. Secondly, considering that technological progress can affect law[47], some scholars consider AI to be especially disruptive of global governance and international law.[48] From a services perspective the impact of AI could be particularly significant since the GATS coverage extends to suppliers[49], which are likely to be (greatly) affected by a general-purpose technology that aims at substituting for, or improving upon, human performance in specific tasks.[50] In addition, most debates on the relationship between domestic regulatory autonomy and obligations under

[45] Peng, Lin, Ching-Fu and Streinz (n 29) 5.
[46] Fleuter (n 25); Zhang and Shang (n 37) e-products; Baker and others (n 25).
[47] David Friedman, 'Does Technology Require New Law Symposium: Is Technology Changing the Law' (2001) 25 Harvard Journal of Law & Public Policy 71; Roger Brownsword, 'Law and Technology: Two Modes of Disruption, Three Legal Mind-Sets, and the Big Picture of Regulatory Responsibilities' (2018) 14 Indian Journal of Law and Technology 1; Lyria Bennett Moses, 'Why Have a Theory of Law and Technological Change' (2007) 8 Minnesota Journal of Law, Science & Technology 589.
[48] Matthijs M Maas, 'International Law Does Not Compute: Artificial Intelligence and the Development, Displacement or Destruction of the Global Legal Order' (2019) 20 Melbourne Journal of International Law 29; Peng, Lin, Ching-Fu and Streinz (n 29).
[49] The General Agreement on Tariffs and Trade (GATT) covers only goods. The GATS covers both services and services suppliers.
[50] Maas (n 48) 30.

international trade agreements focus around the GATS.[51] Lastly, services are emerging as a key driver of global digital trade, impacting growth, productivity and employment.[52] The WTO reports that between 2005 and 2017 trade in services expanded faster than trade in goods, at 5.4 per cent per year on average.[53] The increasing role of services is partly attributable to the emergence of servicification, which refers to the increasing use, production, and sale of services in manufacturing, with services being used as inputs in the form of activities within firms, or as output sold bundled with goods.[54]

1.4 Methodology of analysis

This study is based primarily on a legal research methodological approach that includes the doctrinal analysis of legislation and caselaw.[55] Primary sources include the text of domestic rules and regulations, proposed or adopted by national governments (e.g., Executive Orders by US President, European Commission regulations), international trade treaties (e.g., GATS and bilateral trade agreements), and WTO Panels and Appellate Body (AB) reports.

The research is structured into four parts and seven chapters. The first three parts cover each of the three key variables at the heart of this study: artificial intelligence, AI governance, and trade governance. Part I, comprising Chapter 2, is dedicated to discussing the nature, origins, and main characteristics of artificial intelligence, as well as the benefits and risks associated with its use. It aims to dispel a few misconceptions

[51] Markus Krajewski, 'Recognition, Standardisation and Harmonisation: Which Rules for GATS in Times of Crisis?' in Marion Panizzon, Nicole Pohl and Pierre Sauvé (eds), *GATS and the Regulation of International Trade in Services* (Cambridge University Press 2008) 411.
[52] World Trade Organization, 'World Trade Report 2019: The Future of Services Trade' (World Trade Organization 2019) Text 14 <https://www.wto-ilibrary.org/trade-monitoring/world-trade-report-2019_7e6f8c91-en> accessed 1 December 2021; Marta Soprana, 'Facilitation 2.0: Services and Trade in the Digital Age' (International Centre for Trade and Sustainable Development and Inter-American Development Bank 2018) 1.
[53] World Trade Organization, 'World Trade Report 2019: The Future of Services Trade' (n 52) 21.
[54] Sébastien Miroudot and Charles Cadestin, 'Services In Global Value Chains: From Inputs to Value-Creating Activities' (OECD Publishing 2017) OECD Trade Policy Papers N. 917 5; Magnus Lodefalk, 'Servicification of Firms and Trade Policy Implications' (2017) 16 World Trade Review 59, 60; Magnus Lodefalk, 'Servicification of Manufacturing – Evidence from Sweden' (2013) 6 International Journal of Economics and Business Research 87.
[55] Terry Hutchinson and Nigel Duncan, 'Defining and Describing What We Do: Doctrinal Legal Research' (2012) 17 Deakin Law Review 83, 98.

about this technology and clarify how AI stands out among other digital technologies and why it is generating growing interest in multiple stakeholders, including governments. It also seeks to provide some context on the debate about the ability of international trade law to keep up with technological progress by offering an historical review of the relationship between AI development and the Uruguay Round negotiations that led to the creation of the WTO and to the conclusion of the first multilateral agreement on trade in services.

Part II, which includes Chapters 3 and 4, focuses on policies that may affect AI and trade in services that are powered by this technology. Chapter 3 offers an overview of some digital trade-related policies adopted or implemented since the mid-1990s that, although neither specific nor exclusive to artificial intelligence, may affect its functioning because they target three key components of this technology, namely data, algorithms, and computing power. Chapter 4, on the other hand, explores the emerging trend of policies explicitly designed to influence the development and use of artificial intelligence (i.e., AI-specific policies), which have started to blossom since the mid-2010s. Particular attention is dedicated to three types of policies, namely the development of AI ethical principles and guidelines, AI standards, and AI-specific subsidies. Overall, Part II intends to examine the nature and evolution of efforts to govern artificial intelligence outside the WTO rule-making framework and how they may relate to international trade law.

Part III, comprising Chapters 5 and 6, explores the relationship between AI governance and trade governance in the field of trade in services. Chapter 5 explores the treatment of artificial intelligence under the GATS, whereas Chapter 6 examines the emergence of new rules on digital trade in PTAs and in the WTO negotiating forum, in order to identify disciplines that may be relevant from an AI governance perspective. Part III serves a twofold purpose. On the one hand, it aims to assess the impact of artificial intelligence on existing WTO law in the trade in services field and on emerging digital trade regulation. On the other, it aims to determine to what extent treaty obligations in international trade agreements may limit efforts to regulate AI outside the WTO framework.

This study concludes with some legal and policy remarks in Part IV. Starting with a brief synopsis of the key findings in Parts I, II and III, Chapter 7 proceeds to offer some thoughts on how, moving forward, governments could reconcile governance efforts aimed at promoting AI and/or minimizing the risks associated with its use with the pursuit of trade liberalization set in WTO law. In particular, it discusses which options are available to governments to potentially update trade rules for the AI era, and what factors may affect the willingness and ability of WTO members to do so.

1.5 Limits of the analysis

The analysis in this study is subject to a few methodological limitations. First, since comprehensive academic studies and analysis of AI-specific governmental measures are still rather limited, this research had to rely also on non-academic secondary sources for analytical insights on the recent phenomena of AI commercialization and AI-specific regulation.

Second, for certain laws, rules, and regulations whose official versions are in languages other than English, French, Italian and Spanish[56], the study relied on the English translations found in secondary sources due to the author's language capabilities constraints. Likewise, for the discussion of the plurilateral negotiations on electronic commerce currently taking place at the WTO, this research used a WTO document that, albeit restricted to the public, was leaked by another entity alleging its veracity. Unbeknownst to the author, these unofficial interpretations and leaked document may contain errors or misinformation that might have influenced the outcome of the doctrinal analysis.

Also, since the topic is relatively new and governments have only recently started to adopt AI-specific policies, some observations contained in this study are based on assumptions regarding how future legislation could be shaped based on the information contained in soft law instruments that recommend, rather than mandate, behaviour.

[56] For example, Chinese, Russian, Turkish and Vietnamese.

Moreover, whilst this study acknowledges that the terms 'digital trade'[57] and 'electronic commerce'[58] are not equivalent, they are used interchangeably for the purposes of this research, following a somewhat consolidated practice among governments and scholars to conflate the two terms for practical reasons. Similarly, while recognizing that in computer science the terms 'AI system', 'AI machine', and 'AI computer' may not have the same meaning, they are used interchangeably throughout this study.

Finally, while this research focuses on the relationship between international trade law and AI governance from a services perspective, this study recognizes that other WTO agreements may impose limits on attempts to govern artificial intelligence. Indeed, AI-specific policies that affect the cross-border trade of AI-embedded final products (e.g., robots and autonomous vehicles) or AI-related intermediate products (e.g., microprocessors) could fall under the scope of application of the General Agreement on Tariffs and Trade (GATT) and/or issue-specific agreements. For instance, the emergence of technical standards for artificial intelligence in the field of autonomous vehicles and smart manufacturing raises questions regarding their consistency with the provisions of the Agreement on Technical Barriers to Trade (TBT). Likewise, concerns may arise as to the extent to which the commitments undertaken by some WTO members under the Information Technology Agreement (ITA) apply to A-embedded, AI-powered, AI-enabled, or AI-relevant products. Finally, the widespread commercialization of artificial intelligence in the XXI century may pose a legal challenge to intellectual property rights and the potential application of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) to AI-specific policies. For example, as pointed out by Mercurio and Yu, AI raises concerns regarding ownership rights and in particular its impact on the concept of inventiveness for patents (Article

[57] There is no universally agreed definition of digital trade. The OECD defines it as encompassing "digitally-enabled transactions of trade in goods and services that can either be digitally or physically delivered, and that involve consumers, firms, and governments. Javier López González and Marie-Agnes Jouanjean, 'Digital Trade: Developing a Framework for Analysis' (OECD Publishing 2017) OECD Trade Policy Papers N. 205 6.

[58] For the purposes of the Work Programme on Electronic Commerce, the WTO defines electronic commerce as "the production, distribution, marketing, sale or delivery of goods and services by electronic means". WTO, 'Work Programme on Electronic Commerce - Adopted by the General Council on 25 September 1998 (30 September 1998)' WT/L/274.

27.1 of TRIPS) and of originality for copyright (Article 9.2 of TRIPS).[59] Likewise, it is unclear to what extent current rules on trade secrets under the TRIPS agreement may suffice to limit the imposition of AI-related measures that require access to, disclosure or transfer of source code as a condition for market access. However, considering that this research was subject to certain time and resource constraints, this study focuses on the analysis of the relationship between AI governance and international trade law only from a services perspective, leaving the examination of WTO agreements covering trade in goods and intellectual property rights through an AI lens for future research.

Nonetheless, this study acknowledges that in some circumstances it can be difficult to identify whether an AI application is a good or a service, as some 'hybrid' digital products with embedded AI may not appear to properly fit in the WTO goods/services dichotomy. However, for the purposes of this research, the analysis focuses exclusively on the applicability of the GATS, leaving the potential applicability of other WTO agreements to 'hybrid' digital products for future research.

1.6 Research relevance and contribution to the field of international trade law

This study is expected to contribute to the field of international trade law in three ways. First, it advances research in one area of digital trade governance that is currently underexplored. Within the realm of international economic law artificial intelligence and the exploration of the relationship between AI governance and trade governance is still a relatively niche topic. By focusing on AI-powered services and AI-specific policies this study helps advance knowledge on one aspect of digital trade regulation that scholarly work has not yet explored in a comprehensive and systematic manner, namely the treatment of AI-powered services and AI-specific policies under the current WTO framework.

[59] Bryan Mercurio and Ronald Yu, 'Convergence, Complexity and Uncertainty: Artificial Intelligence and Intellectual Property Protection' in Ching-Fu Lin, Shin-yi Peng and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law: Disruption, Regulation, and Reconfiguration* (Cambridge University Press 2021) 143, 147.

Second, it could provide a framework for analysis of the relationship between AI governance and other fields of global trade governance, such as trade in goods and intellectual property rights, that fall outside the scope of this study. More specifically, future studies on AI governance from a GATT or TRIPS perspective could follow the four-step analytical approach suggested by this study. This would entail a determination of how artificial intelligence connects to trade (e.g., how this technology and AI-specific policies affects IPR or trade in goods), an identification of the trade rules that may potentially be relevant from an AI perspective (e.g., disciplines on subsidies; provisions on patents, copyright or trade secrets), an assessment of how existing rules may impact efforts to govern AI outside the WTO framework, and an examination of how new rules on digital trade in plurilateral and preferential trade agreements address legal and policy challenges brought on by AI concerning trade in goods and intellectual property rights.

Lastly, it can add to the literature on trade in services and the applicability of GATS rules in the digital era. Indeed, by providing an in-depth analysis of the GATS from an AI perspective, this study offers new insights on key legal concepts such as likeness, classification of services, modes of supply, and the applicability of GATS rules that are subject to a standing negotiating mandate (e.g., domestic regulation and subsidies). It also contributes some clarifications on the extent to which GATS rules are able to respond to technological progress.

This research also has some practical relevance, as it can offer policymakers some guidance on how to balance the pursuit of AI-related policy objectives (e.g., algorithmic accountability, transparency, privacy protection, safety) with trade policy objectives. More specifically, this study could help policymakers understand the limits that international trade agreements can place on their ability to design domestic regulation aimed at promoting artificial intelligence or minimizing the risks arising from its use. It could also provide some insight on WTO adjudication and the potential settlement of disputes centred around emerging AI regulation. Indeed, considering that no WTO dispute has dealt with AI-specific policies so far, this research could provide WTO adjudicators with useful information about the nature of a technology

they may be unfamiliar with and the potential key interpretative challenges that may lie at the center of future AI-related trade disputes. Overall, this study may help governments reconsider the extent to which existing rules can keep up with technological progress, evaluate the need for new disciplines that take into account the peculiar nature of Al, and rethink the role of the WTO in the AI era.

PART I - Understanding the Technology: What is Artificial Intelligence?

2 Chapter - Artificial Intelligence: New Kid on the Block or Old-Time Friend?

2.1 Introduction

Artificial intelligence has been referred to as one of the emerging technologies underpinning the Fourth Industrial Revolution and the subsequent development of the data-driven economy and digital trade.[60] However, conflating all digital technologies under the 'emerging' banner can be somewhat misleading as marked differences exists among them. Some technologies are 'emerging' in the sense that they are new. For example, blockchain was first conceptualised by Satoshi Nakamoto at the end of the 2000s[61], thus coming into existence almost a decade after the beginning of the XXI century. Others are 'emerging' in the sense that they grew in the last three decades. Case in point is the Internet of Things, which was first conceptualised in the early 1980s but started thriving almost two decades later.[62] Artificial intelligence, on the other hand, was first conceptualised in the 1950s, making it one of the eldest digital technologies. However, it has effectively come to the increasing attention of the wider public only in the last decade.

From an international trade law perspective assessing the 'emerging' nature of AI holds great significance, since it could affect the extent to which this technology is deemed to fall within the purview of WTO agreements, which were negotiated between the late 1980s and the early 1990s. Arguments in favour of excluding AI from the scope of application of the obligations and scheduled commitments undertaken by WTO Members in the mid-1990s would rest on the idea that AI was generally unknown at

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[60] Schwab (n 1) 1; Maas (n 48) 23; Irion (n 34) 40.
[61] Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System.' [2008] Decentralized Business Review 21260.
[62] Himadri Nath Saha, Abhilasha Mandal and Abhirup Sinha, 'Recent Trends in the Internet of Things', *2017 IEEE 7th Annual Computing and Communication Workshop and Conference (CCWC)* (2017).

the time of the Uruguay Round negotiations and emerged only after their conclusion, as evidenced by the fact that the word 'artificial intelligence' appears nowhere in the WTO agreements.[63] Arguments in favour of the opposite position could focus on the history of AI and early attempts at commercialisation in the 1980s, relying on dynamic and evolutionary treaty interpretation by WTO adjudicators to support the view that this technology is covered by multilateral trade agreements.[64]

Thus, inserting itself in this debate, this chapter serves a two-fold purpose. On the one hand, it aims to discuss how novel artificial intelligence was at the time the WTO was established, with a view to determine the extent to which AI regulation may be relevant for international trade law. On the other hand, it aims at identifying the key features that make AI stand out among digital technologies, with a view to explain why this technology warrants specific attention from a digital trade law perspective.

Starting with a discussion on the definition of AI (Section 2.2) and the heterogeneity of this technology (Section 2.3), the chapter proceeds with a brief historical overview aimed at explaining why artificial intelligence is not a new technology *sensu stricto* but rather a technology that, first conceptualized decades ago, has been able to 'emerge' (i.e., find commercial application) only in recent years (Section 2.4). Section 2.5 describes the main features of Al, with a focus on its main components, followed by an overview of its potential applications, especially in the services sector, in Section 2.6. The chapter then proceeds with an assessment of the potential benefits and risks associated with the development and use of AI (Section 2.7). Concluding remarks follow in Section 2.8.

[63] Chander (n 32) 119–120; Ruosi Zhang, 'Covered or Not Covered: That Is the Question - Services Classification and Its Implications for Specific Commitments under the GATS' (2015) WTO Working Paper ERSD-2015-11.
[64] Appellate Body Report, *United States— Measures Affecting the Cross-Border Supply of Gambling and Betting Services*, WT/DS285/AB/R, adopted on 20 April 2005; Appellate Body Report, *China — Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Product*, WT/DS363/AB/R, adopted on 19 January 2010.

2.2 Defining Artificial Intelligence

Generally considered as referring to the "incorporation of human intelligence in machines"[65], artificial intelligence has been described as a 'fuzzy concept' for which there is no universally agreed definition.[66] On the contrary, a plethora of definitions has emerged in recent years.[67] For example, for the US Government AI "enables computers and other automated systems to perform tasks that have historically required human cognition and what we typically consider human decision-making abilities".[68] The European Commission refers to AI as "a collection of technologies that combine data, algorithms and computing power"[69] and to 'AI systems' as software that is developed with certain techniques and approaches (e.g. machine learning, statistical approaches, symbolic reasoning and expert systems) and can, for a given set of human-defined objectives, generate outputs such as decisions, recommendations, content or predictions influencing the environment they interact with.[70] India describes it as "a constellation of technologies that enable machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act".[71]

Several scholars have also used the term 'artificial intelligence' to describe the field of study that focuses on the ability of computers to imitate human intelligence,[72] a

[65] Deepak Jakhar and Ishmeet Kaur, 'Artificial Intelligence, Machine Learning and Deep Learning: Definitions and Differences' (2020) 45 Clinical and Experimental Dermatology 131, 131–132.
[66] Dimitris Visvikis and others, 'Artificial Intelligence, Machine (Deep) Learning and Radio(Geno)Mics: Definitions and Nuclear Medicine Imaging Applications' (2019) 46 European Journal of Nuclear Medicine and Molecular Imaging 2630; Pei Wang, 'On Defining Artificial Intelligence' (2019) 10 Journal of Artificial General Intelligence 1, 1–2.
[67] European Commission, 'AI Watch: Defining Artificial Intelligence - Towards an Operational Definition and Taxonomy of Artificial Intelligence.' (2020) JRC Technical Report.
[68] US National Science and Technology Council, 'The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update' <https://www.whitehouse.gov/wp-content/uploads/2019/06/National-AI-Research-and-Development-Strategic-Plan-2019-Update-June-2019.pdf>.
[69] European Commission, 'White Paper on Artificial Intelligence: A European Approach to Excellence and Trust' (European Commission 2020).
[70] Proposal for the Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts (COM(2021) 206 Final), adopted on 21 April 2021 Art. 3(1).
[71] NITI Aayog, 'National Strategy on Artificial Intelligence' (NITI Aayog 2018) 12.
[72] Artificial Intelligence is "a field of computer science dedicated to the creation of systems performing tasks that usually require human intelligence" (Jakhar and Kaur (n 65) 131–132.); or "a branch of computer science devoted to developing data processing systems that perform functions normally associated with human intelligence, such as reasoning, learning, and self-improvement" (International

behavioural property of computers,[73] or a type of technology.[74] Some describe this technology as algorithms that have been trained on large quantities of data[75], where algorithms are to be intended as procedures for solving a mathematical problem in a finite number of steps that frequently involve the repetition of an operation.[76] Others refer to AI as "man-made systems with a certain degree of capacity to learn and apply knowledge.[77] Overall, as Kaplan points out, most proposed definitions tend to align around "the concept of creating computer programs or machines capable of behaviour we would regard as intelligent if exhibited by humans."[78]

For the purposes of discussion and analysis, this study draws heavily from the definition of AI offered by the OECD Expert Group on AI (AIGO) which describes AI systems as machine-based systems that can make predictions, recommendations or decisions influencing real or virtual environments, given a set of human-defined objectives, and are designed to operate with varying levels of autonomy.[79]

From a legal perspective, the absence of a commonly agreed definition of artificial intelligence may affect the interpretation of legally binding instruments that include references to AI or AI-specific provisions, including multilateral and regional trade

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Organization for Standardization, 'ISO/IEC 2382:2015, Information Technology — Vocabulary, ISO/IEC 2382-1:1993' <https://www.iso.org/obp/ui/#iso:std:iso-iec:2382:ed-1:v1:en> accessed 9 November 2020.).

[73] For example, artificial intelligence has been defined as "the pursuit of performing tasks usually reserved for human cognition: recognizing patterns, predicting outcomes clouded by uncertainty, and making complex decisions" (Kai-fu Lee, 'The Four Waves of A.I.' (2018) 178 Fortune 92, 93.); "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Andreas Kaplan and Michael Haenlein, 'Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence' (2019) 62 Business Horizons 15, 15.); and "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings" (BJ Copeland, 'Artificial Intelligence | Definition, Examples, and Applications', *Encyclopedia Britannica* (2020) <https://www.britannica.com/technology/artificial-intelligence> accessed 29 September 2020.)

[74] Artificial intelligence has been described as "a collection of interrelated technologies used to solve problems autonomously and perform tasks to achieve defined objectives without explicit guidance from a human being" (D Dawson and others, 'Artificial Intelligence: Australia's Ethics Framework' (Data61 CSIRO 2019) 14.).

[75] Michele Fink, 'Legal Analysis of International Trade Law and Digital Trade' (European Parliament's Committee on International Trade, European Union 2020) 4.

[76] Merriam-Webster.com, 'Algorithm' <https://www.merriam-webster.com/dictionary/algorithm> accessed 13 April 2021.

[77] Liu, Han-Wei and Lin, Ching-Fu (n 33) 414.

[78] Jerry Kaplan, *Artificial Intelligence: What Everyone Needs to Know* (Oxford University Press 2016) 1.

[79] OECD, *Artificial Intelligence in Society* (OECD Publishing 2019) 15.

agreements. The use of relatively broad, quite nebulous, and rather ambiguous terminology may result in a certain degree of flexibility and discretion in its legal interpretation. This in turn may affect the interpretation of legal obligations and commitments as those contained in international trade agreements, potentially further igniting the debate over the interpretative power of WTO adjudicators and their 'judicial overreach'.[80] Indeed, in the absence of a universally agreed definition of artificial intelligence, issues of legal interpretation may arise in relation to the scope of application of certain AI-specific disciplines contained in a few recent preferential trade agreements where no definition of artificial intelligence can be found.[81] Although WTO jurisprudence often suggests to start from the ordinary meaning of the relevant terms of a commitment, in case of a WTO dispute centred around AI-related measures affecting trade in services, Panels and the AB may find that dictionaries "are not necessarily capable of resolving complex questions of interpretation".[82] For example, while the Merriam-Webster provides a general definition of AI that encompasses two meanings (i.e. "a branch of computer science dealing with the simulation of intelligent behavior" and "the capability of a machine to imitate intelligent human behavior"[83]), the English Oxford Living Dictionary offers specific information on the functioning of this technology, which it defines as "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception,

[80] Roger P Alford, 'Reflections on US - Zeroing: A Study in Judicial Overreaching by the WTO Appellate Body Essays on the World Trade Organization' (2006) 45 Columbia Journal of Transnational Law 196; Henry Gao and Weihuan Zhou, '"Overreaching" or "Overreacting"? Reflections on the Judicial Function and Approaches of WTO Appellate Body' (2019) 53 Journal of World Trade 951; Ernst-Ulrich Petersmann, 'From Integration Through Law to Global Community Law? Between Arbitration, Adjudication and Judicial Overreach' (Max Plank Institute for Comparative Public Law & International Lax (Forthcoming in the Global Community Yearbook of the International Law and Jurisprudence 2020 (2021)) 2020) Research Paper N. 2020-37.

[81] See Article 31 of the Australia-Singapore Digital Economy Agreement (DEA), Article 8.2 of the Digital Economy Partnership Agreement (DEPA), and Article 8.2 and 16.4 of the Draft Working Text of the UK-EU Comprehensive Free Trade Agreement (CFTA). Australia-Singapore Digital Economy Agreement 2020; Digital Economy Partnership Agreement 2020; UK Government, 'Draft Working Text for a Comprehensive Free Trade Agreement Between the United Kingdom and the European Union' <https://www.gov.uk/government/publications/our-approach-to-the-future-relationship-with-the-eu> accessed 19 May 2020.

[82] Liu, Han-Wei and Lin, Ching-Fu (n 33) 413; AB Report, *US-Gambling* (n 64) para 164.

[83] Merriam-Webster.com, 'Artificial Intelligence' <https://www.merriam-webster.com/dictionary/artificial+intelligence> accessed 13 April 2021.

speech recognition, decision-making, and translation between languages".[84] Thus, as Liu and Lin observe, countries may find it challenging come up with a satisfactory definition of AI through legislation or normative/policy documents that could affect how negotiators build up a common vocabulary for future digital trade disciplines.[85]

Yet, some benefits could accrue from the lack of a common definition of artificial intelligence. It could help reduce the risk of discipline obsolescence and may provide governments with more margin for negotiation. Indeed, it could give countries the opportunity to agree on negotiating new AI-related rules without being tied down to a terminology that could run the risk of being inopportunely outpaced by technological progress.

Still, the presence of multiple definitions of artificial intelligence may result in misguided and fragmented policy action, and could potentially hinder transnational cooperation.[86] In the absence of a universally agreed definition of AI, policymakers may struggle to properly assess what AI is, how it works, how it is expected to develop in the future and what kind of AI systems and technologies are actually desirable.[87] This, in turn, may affect their ability to determine what impact this technology can have on the economy, including trade, and, consequently, to design policies that can strike the right balance between the promotion of AI innovation and other legitimate policy objectives, including the pursuit and facilitation of (digital) trade liberalization.

2.3 The heterogeneity of AI technology

The lack of a univocal definition of artificial intelligence may have contributed to the confusion among non-AI experts on the actual features, development status and implementation of this technology. Possibly influenced by movies[88] and the rather

[84] English Oxford Living Dictionary, 'Artificial Intelligence' <https://www.lexico.com/definition/artificial_intelligence> accessed 13 April 2021.
[85] Liu, Han-Wei and Lin, Ching-Fu (n 33) 413.
[86] Wang (n 66) 1–2.
[87] Sankalp Bhatnagar and others, 'Mapping Intelligence: Requirements and Possibilities' in Vincent C Müller (ed), *Philosophy and Theory of Artificial Intelligence* (Springer 2018).
[88] Numerous science-fiction movies have focused on AI. Among them are 'Metropolis' (1927), Blade Runner' (1982), 'Terminator' (1984), 'Robocop' (1987), 'Ex-Machina (2015), whose plots concern robots that physically resemble humans and act like them. '2001: Space Odyssey (1968) by Stanley Kubrick features HAL, an AI computer, among its main characters.

bleak views expressed by some renowned scientists and visionary tech entrepreneurs about its future [89], the average person tends to think of AI as primarily anthropomorphic cyborgs with the ability to outperform humans that could, at a minimum, lead to job displacement[90] or, in the worst-case scenario, cause human extinction.[91]

To help dissipate some of the confusion around artificial intelligence and help facilitate dialogue within the international trade community, it is worth examining in further detail some of its most frequent categorizations, providing a better understanding of their rationale and implications.[92] Since AI is in continuous development both from a theoretical and a practical standpoint, shedding light on the various types of AI and their stage of development may enable trade lawyers and policymakers to identify what AI technology is currently available to public and private entities for the production and supply of services across borders, and to determine the relevance of each type of AI technology for international economic law in the short term as well as in the long term.

[89] Stephen Hawkings and others, 'Stephen Hawking: "Transcendence Looks at the Implications of Artificial Intelligence - But Are We Taking Artificial Intelligence Seriously Enough?"' (*The Independent*, 23 October 2017) <https://www.independent.co.uk/news/science/stephen-hawking-transcendence-looks-implications-artificial-intelligence-are-we-taking-ai-seriously-enough-9313474.html> accessed 10 October 2021; Eric Mack, 'Bill Gates Says You Should Worry About Artificial Intelligence' (*Forbes*, 28 January 2015) <https://www.forbes.com/sites/ericmack/2015/01/28/bill-gates-also-worries-artificial-intelligence-is-a-threat/> accessed 10 October 2021; Matt McFarland, 'Elon Musk: "With Artificial Intelligence We Are Summoning the Demon."' (*The Washington Post*, 8 October 2014) <https://www.washingtonpost.com/news/innovations/wp/2014/10/24/elon-musk-with-artificial-intelligence-we-are-summoning-the-demon/> accessed 10 October 2021.

[90] Richard Baldwin, *The Globotics Upheaval: Globalization, Robotics, and the Future of Work* (Illustrated edition, Oxford University Press 2019); Carl Benedikt Frey and Michael A Osborne, 'The Future of Employment: How Susceptible Are Jobs to Computerisation?' (2017) 114 Technological Forecasting and Social Change 254; Rishabh Patrawala, 'The Artificial Intelligence Era Its Seismic Potential to Create a Job Displacement Conundrum' [2019] IIBM'S Journal of Management Research 112; Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach (Pearson Series in Artificial Intelligence)* (4th edn, Pearson 2021) 31–32.

[91] Rory Cellan-Jones, 'Stephen Hawking Warns Artificial Intelligence Could End Mankind' (*BBC News*, 2 December 2014) <https://www.bbc.com/news/technology-30290540> accessed 10 October 2021.

[92] Liu, Han-Wei and Lin, Ching-Fu (n 33) 414; NITI Aayog (n 71) 15.

2.3.1 Narrow AI *vs* General AI

First, artificial intelligence can be classified according to the complexity of the tasks that it is designed and able to undertake. More specifically, AI can be narrow, general, or super. At the one end of the spectrum lies 'narrow AI', which refers to AI technology that can only perform a single task or set number of tasks [93] or functions only in clearly defined single domains.[94] Deep Blue, the first chess-playing computer to win against a (human) world champion[95], and AlphaGo, the first computer to defeat a (human) Go world champion[96], best represent the limited capabilities of narrow AI machines.[97] These two AI computers can only play the individual game they were designed for (i.e. chess for Deep Blue and Go for AlphaGo), thus leaving them unable to perform outside their respective restricted game domains. Language translation using an AI machine constitute an example of narrow AI in the services field.[98]

Somewhere in the middle stands Artificial General Intelligence (AGI). Considered the Holy Grail of AI research, AGI refers to "the construction of a software program that can solve a variety of complex problems in a variety of different domains, and that controls itself autonomously, with its own thoughts, worries, feelings, strengths, weaknesses and predispositions".[99] In comparison to narrow AI, AGI is expected to better simulate human intelligence.

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[93] NITI Aayog (n 71) 15.
[94] Lee (n 73) 93.
[95] Developed by IBM in the late 1980s, Deep Blue was programmed to solve the complex, strategic game of chess, in order to test the calculating abilities of computers explore and understand the limits of massively parallel processing. On May 17, 1997 Deep Blue beat world champion chess player Garry Kasparov after a six-games match. IBM, 'Deep Blue' (*IBM Corporation*, 2012) <https://www.ibm.com/ibm/history/ibm100/us/en/icons/deepblue/> accessed 13 October 2020.
[96] AlphaGo is a computer program developed by Deep Mind, a Google-owned AI company, to play Go, an ancient Chinese board game known for its complexity. After winning its first ever game against a Go professional in October 2015, AlphaGo beat legendary Go player Lee Sedol, the winner of 18 world titles, on March 2016. DeepMind, 'AlphaGo: The story so far' (2020) </research/case-studies/alphago-the-story-so-far> accessed 13 October 2020.
[97] NITI Aayog (n 71) 15.
[98] John Frank Weaver, 'Regulation of Artificial Intelligence in the United States' in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar Publishing 2018) 155.
[99] Ben Goertzel and Cassio Pennachin (eds), 'Contemporary Approaches to Artificial General Intelligence' in Ben Goertzel and Cassio Pennachin, *Artificial General Intelligence* (Springer-Verlag 2007) 1.

At the very end of the spectrum is 'superintelligence', a term used to describe AI systems that have a superhuman level of general intelligence, meaning whose intellect greatly exceeds the cognitive performance of humans in virtually all domains of interest.[100] The Singularity[101], or idea that AI could surpass human intelligence[102], is based on Moore's Law[103], which posits that microprocessors are expected to double their processing power every two years, or more generally, the law of accelerating returns for technology.[104]

Artificial intelligence in its current development status can be best described as 'narrow', with computer scientists and AI researchers making big strides in creating algorithms with capabilities limited to single tasks and/or domains. Albeit numerous AI scientists hold the rather optimistic view that 2040 could mark the beginning of the era of general artificial intelligence[105], sceptics suggest that AGI is still a long way from becoming a reality.[106]

Sometimes narrow AI and general AI are referred to as 'weak AI' and 'strong AI', respectively, when it is necessary to distinguish computers based on their cognitive characteristics. Weak AI posits that machines merely simulate, rather than duplicate, real intelligence, meaning that even if the system appears to behave intelligently, it lacks consciousness about what it is doing, so it is simply acting 'as if' it were

[100] Nick Bostrom, *Superintelligence: Paths, Dangers and Strategies* (Oxford University Press 2014) 26–27.
[101] Ray Kurzweil, *The Singularity Is Near: When Humans Transcend Biology* (Penguin Books 2005).
[102] For Kaplan 'singularity' refers to the "idea that at some point in time, machines will become sufficiently smart so that they will be able to reengineer and improve themselves, leading to runaway intelligence". Kaplan (n 78) 138.
[103] According to Moore, the co-founder of Intel, the number of transistors in a dense integrated circuit is expected to double every two years, meaning that computing power is expected to double every two years. Gordon E Moore, 'Cramming More Components onto Integrated Circuits' (1965) 38 Electronics 114, 115.
[104] Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar Publishing 2018) 230.
[105] Vincent C Müller and Nick Bostrom, 'Future Progress in Artificial Intelligence: A Survey of Expert Opinion' in Vincent C Müller (ed), *Fundamental Issues of Artificial Intelligence* (Springer International Publishing 2016) <https://doi.org/10.1007/978-3-319-26485-1_33> accessed 24 December 2021.
[106] No one has yet claimed the first production or development of AGI and recent advances in deep learning (an AI sub-field) should not be considered as inevitably leading to 'general' artificial intelligence. NITI Aayog (n 71) 15; Kai-Fu Lee, *AI Superpowers: China, Silicon Valley, and the New World Order* (Illustrated Edition, Houghton Mifflin Harcourt 2018) 141.

intelligent.[107] Chatbots, computer programs designed to have a conversation with a human being, especially over the internet[108], are the best representation of a real-life application of weak AI. Au contraire, strong AI describes machines that possess human cognitive capabilities, meaning that they behave intelligently with a conscious, subjective mind like humans do.[109] Currently, real-life applications of AI are limited to the realm of weak AI, as scepticism remains as to whether machines will ever be able to have minds.

2.3.2 Machine Learning *vs* Deep Learning

Artificial intelligence can also be distinguished based on the learning technique used to train the AI systems. Two of these techniques are the most commonly used to describe AI in the XXI century: (i) machine learning (ML); and (ii) deep learning (DL). A sub-field of artificial intelligence, ML was first conceptualized in 1943.[110] It is an umbrella term used to describe computer programs, algorithms and statistical models that learn to recognize, infer, and extract patterns from data.[111] In ML, machines are provided with learning methods, rather than, or in addition to, formalized knowledge.[112] The 'learning' aspect of ML and its dynamic nature[113] enable computers to learn how to make decisions and perform specific tasks without explicit instructions from a human operator.[114] Thus, ML studies the ability to improve performance based

[107] Kaplan (n 78) 87; John R Searle, 'Minds, Brains, and Programs' (1980) 3 Behavioral and Brain Sciences 417, 417; JR Searle, 'The Chinese Room Revisited' (1982) 5 Behavioral and Brain Sciences 345, 345; NITI Aayog (n 71) 15.

[108] Cambridge English Dictionary, 'Chatbot' <https://dictionary.cambridge.org/dictionary/english/chatbot> accessed 13 April 2021.

[109] Kaplan (n 78) 87; Searle, 'Minds, Brains, and Programs' (n 107) 417; NITI Aayog (n 71) 15.

[110] Warren S McCulloch and Walter Pitts, 'A Logical Calculus of the Ideas Immanent in Nervous Activity' (1943) 5 The bulletin of mathematical biophysics 115.

[111] Generally, when training a machine learning model, part of the data is held back and then subsequently used to test the accuracy of the trained model. Kaplan (n 78) 27; X Du-Harpur and others, 'What Is AI? Applications of Artificial Intelligence to Dermatology' (2020) 183 British Journal of Dermatology 423, 424; Lee (n 106) 6; Jakhar and Kaur (n 65) 131–132.

[112] Lagioia and Sartor (n 22) 285.

[113] The 'learning' aspect of ML means that the ML algorithms attempt to minimize the errors and maximize the likelihood of their predictions being true whereas 'dynamic' ML refers to its ability of modify itself when exposed to more data. Jakhar and Kaur (n 65) 131–132.

[114] Du-Harpur and others (n 111) 424; Lee (n 106) 6; Jakhar and Kaur (n 65) 131–132; Sikender Mohsienuddin Mohammad, 'Artificial Intelligence in Information Technology' [2020] SSRN Electronic Journal 3–4; Ethem Alpaydin, *Introduction to Machine Learning* (MIT Press 2020) 3.

on experience.[115] Some scholars opine that this methodological approach is well suited for situations requiring sensory perception or extracting patterns from drafting data.[116]

There are three types of learning processes at the basis of machine learning, which are determined by the type of feedback that accompanies the inputs: (i) supervised; (ii) unsupervised; and (iii) reinforcement.[117] In supervised learning the machine is provided in advance a training set (i.e. a large set of pairs of inputs and outputs) that it uses to build an algorithmic model (e.g. a set of rules) meant to capture the relevant knowledge originally embedded in the training set, which is then used to provide - hopefully - correct responses to new cases, by mimicking the correlations in the training set.[118] Using labels to infer classification or regression, the training goal of supervised ML is to identify a function that best maps a set of inputs (e.g. images) to their correct output (i.e. label). [119] Supervised learning can be best used for classification tasks using image detection. For example, with supervised learning a machine is trained to recognize an animal by showing it pictures with and without the animal, indicating which contain said animal.[120]

Unsupervised learning, whereby AI systems learn without receiving external instructions - either in advance or as feedback - about what is right or wrong, [121] consists of finding patterns in unlabelled data, meaning that novel patterns such as groups or 'clusters' are identified in data without influence from prior knowledge or labelling.[122] Thus, in unsupervised learning machines are presented only with pictures that contain an animal, without further information, allowing them to infer sophisticated and complex correlations between the images and, as a result, learn to identify pictures of said animal all by themselves, without supervision.[123] Clustering

[115] Russell and Norvig (n 90) 1 footnote 1.
[116] Kaplan (n 78) 36.
[117] Russell and Norvig (n 90) 653.
[118] Lagioia and Sartor (n 22) 286–287.
[119] Visvikis and others (n 66) 2631–2633; Du-Harpur and others (n 111) 424; Russell and Norvig (n 90) 653.
[120] Kaplan (n 78) 30.
[121] Lagioia and Sartor (n 22) 288.
[122] Visvikis and others (n 66) 2631–2633; Du-Harpur and others (n 111) 424.
[123] Kaplan (n 78) 30.

(i.e. detecting large clusters of similar inputs) is the most common unsupervised learning task.[124]

In reinforcement learning the machine learns from a series of rewards or penalties (e.g., points gained or lost) linked to the outcomes of its own actions.[125] This is used especially to train AI machines to play games like chess. For example, if at the end of chess game the machine is told that it won, the machine will establish which of its moves most likely led to this outcome and will modify its actions to aim for more rewards in the future.[126]

At the heart of the current wave of AI[127], deep learning is a learning technique based on the use of multi-layered artificial neural networks[128]. It is a sub-field of machine learning.[129] Referred to as a form of supervised machine learning inspired by biology, DL incorporates computational models and algorithms that imitate the architecture of the biological neural networks in the brain, constructing thousands of layers of artificial neurons that can receive and transmit information and with up to billions of parameters.[130] Unlike the human brain, however, DL neural networks are 'trained' on huge amounts of labelled data, enabling them to use this acquired knowledge to mathematically identify and recognize incredibly subtle patterns within other mountains of data.[131] DL machines receive data inputs (e.g. image, sound element) and provide outputs (i.e. a decision or prediction related to whatever question might be asked) based on what they have learned through the training data they were fed.[132] The learning process through which DL algorithms process training data is reflected in

[124] Russell and Norvig (n 90) 653.
[125] Lagioia and Sartor (n 22) 288.
[126] Russell and Norvig (n 90) 653.
[127] Tencent Research Institute and others (eds), *Artificial Intelligence: A National Strategic Initiative* (Palgrave Macmillan 2021) 6.
[128] Artificial neural networks are computer programs inspired by certain presumed organizational principles of a brain's neural network. Composed of a set of nodes (i.e. neurons) that are arranged in multiple layers and are connected by links, they were developed under the assumption that AI could be achieved by reproducing the human brain rather than the human reasoning. Kaplan (n 78) 28; Lagioia and Sartor (n 22) 288.
[129] Visvikis and others (n 66) 2632; Jakhar and Kaur (n 65) 132.
[130] Du-Harpur and others (n 111) 424; Lee (n 73) 93; Lee (n 106) 8.
[131] Lee (n 73) 93.
[132] ibid.

the modification of the weights (i.e. the interconnections between the neurons and layers).[133]

Deep learning can be considered a paradigm shift for three main reasons.[134] First, by enabling artificial neural networks to learn through a general-purpose procedure, it marks a significant departure from the rules-based or experts systems approach[135], a training method whose success proved to be rather limited.[136] Secondly, deep learning gives AI the ability to do the unexpected, something that mere computer programs do not have.[137] Indeed, deep-learning algorithms trained on an ocean of information are able to discover connections between obscure features of the data that due to their subtlety or complexity would normally escape human logic, thus outstripping the performance of any human 'expert'.[138] Lastly, deep learning works exceptionally well on unstructured and unlabelled data and presents a higher level of accuracy than other ML approaches.[139]

However, deep learning has its challenges, which may limit its widespread implementation. As an AI learning method DL can be subject to significant limitations in computational resources and time, as it requires a huge volume of training data to ensure the minimization of errors in its predictions, and relies on expensive hardware and software for the processing of input data.[140] Also, deep neural networks are prone to overfitting, due in part to their ability to model rare dependencies observed in the training data, thanks to their numerous layers.[141] Nevertheless, deep learning is increasingly becoming the go-to AI technology of the XXI century.

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[133] Lagioia and Sartor (n 22) 289.
[134] Visvikis and others (n 66) 2633.
[135] The rules-based approach (also known as expert systems) refers to the attempt to teach computers to think by encoding a series of logical rules, meaning that AI machines are being fed 'engineered' or 'pre-established' logical rules to follow in their decision-making process. Lee (n 106) 7–8; Visvikis and others (n 66) 2632–2633.
[136] Experts systems required constant updating as the complexity of the tasks increased, could only provide incomplete answers, and were unable to address the peculiarities of individual cases. Lagioia and Sartor (n 22) 285.
[137] NITI Aayog (n 71) 12.
[138] Lee (n 73) 93.
[139] Du-Harpur and others (n 111) 424; Jakhar and Kaur (n 65) 132.
[140] Jakhar and Kaur (n 65) 132.
[141] Visvikis and others (n 66) 2631–2633.

2.4 The 'emerging' nature of AI: an historical perspective

Artificial intelligence, widely considered among the most relevant 'emerging technologies' dominating the digital economy, is not novel, albeit the term has started to appear only very recently in binding international trade agreements.[142] Its first conceptualization and theoretical breakthroughs date back to the mid-XX century. In 1950 renown mathematician Alan Turing, father of theoretical computer science, devised the litmus test of machine intelligence, laying the foundations of AI.[143] However, the term 'artificial intelligence' was first coined only six years later, at the Dartmouth Conference, now commonly considered as the birth of the AI research field.[144]

Since its inception, AI technology has undergone cycles of boom-and-bust, experiencing waves of optimism and great promise (i.e. AI springs) followed by periods of disappointment and lack of substantial results (i.e. AI winters).[145] The first AI era took place between 1952 and 1969 primarily in the United States.[146] A period of early enthusiasm and great expectations[147], characterized by rapid developments in computer technologies[148] and important theoretical breakthroughs[149], that contributed

[142] Australia-Singapore DEA; DEPA; Singapore Ministry of Trade and Industry, 'Launch of Negotiations for the Korea Singapore Digital Partnership Agreement' (*Singapore Ministry of Trade and Industry*, 22 June 2020) <https://www.mti.gov.sg/Newsroom/Press-Releases/2020/06/Launch-of-Negotiations-for-the-Korea-Singapore-Digital-Partnership-Agreement> accessed 19 August 2020; UK Government (n 81). See Chapter VI for further details.

[143] Originally known at the 'imitation game', the Turing Test aims at establishing whether a computer has the ability to exhibit intelligence that is similar or equivalent to that possessed by humans. AM Turing, 'Computing Machinery and Intelligence' (1950) 59 Mind 433.

[144] A group of mathematicians and computer scientists led by professor John McCarthy proposed a Dartmouth Summer Research Project on Artificial Intelligence "on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it [and] find how to make machines use language, form abstractions and concepts to solve kinds of problems now reserved for humans, and improve themselves". John McCarthy and others, 'A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence' (31 August 1955) <http://jmc.stanford.edu/articles/dartmouth.html> accessed 8 September 2020.

[145] NITI Aayog (n 71) 13; Lee (n 106) 6.

[146] Russell and Norvig (n 90) 19.

[147] ibid 18.

[148] Computers went from being massive systems—based on vacuum tubes—to smaller systems run on integrated circuits that were much quicker and had more storage capacity. Tom Taulli, *Artificial Intelligence Basics: A Non-Technical Introduction* (Apress 2019) ch 1.

[149] In 1957 psychologist Frank Rosenblatt introduced the single layer perceptron, a computer system that operates according to probabilistic principles and is able to learn to recognise similarities or identities between patterns of optical, electrical, or tonal information, in a manner analogous to the

to make AI research one of the most sought-after fields in the tech world, this first AI spring saw academia leading AI innovation and development, with little involvement from the private sector.[150]

Between the late 1960s and the early 1970s the enthusiasm for AI started to wane, and the field entered its first winter. Despite significant strides[151], the proposed AI methods proved weak and unable to make significant progress beyond solving a limited number of simple tasks.[152] Intellectual sparring among researchers also contributed to stifling advances in the field.[153] Moreover, capacity constraints of existing computers, reduction in funding resulting from the weak economic environment, and the inability of AI innovation to take place outside the academic setting contributed to hinder AI innovation during this period.[154]

Due to the lack of information and knowledge available or storable in digital form, early research work on AI in the period 1952-1980 was based on methods of mathematical reasoning and logic (i.e. symbol system approach).[155] The emergence of 'expert systems' in the 1980s marked not only the first significant methodological shift in the field but also led to the second 'AI spring', opening up opportunities for the commercialization of products and services based on this AI methodology.[156] Though

human brain. Perceptrons can be considered as the first conceptualization of neutral networks, forming the basis of the modern deep learning technology. Frank Rosenblatt, 'The Perceptron — a Perceiving and Recognizing Automaton' (Cornell Aeronautical Laboratory 1957) Report 85–460–1.

[150] Russell and Norvig (n 90) 18–19; Taulli (n 148) ch 1.

[151] Cases in point are 'backpropagation', essential for assigning weights for neural networks, and 'recurrent neural network (RNN)', which allows for connections to move through the input and output layers. Taulli (n 148) ch 1.

[152] Matjaž Gams, Marcin Paprzycki and Xindong Wu, *Mind Versus Computer: Were Dreyfus and Winograd Right?* (Penn State Press 1997) 30; Russell and Norvig (n 90) 22; Taulli (n 148) ch 1.

[153] By discrediting Rosenblatt's work in their influential book *Perceptrons* (1969), Marvin Minsky and Seymour Papert de facto contributed to foreclosing funding and research on perceptions (and artificial neural networks in general) for over a decade. Kaplan (n 78) 34.

[154] Taulli (n 148) ch 1.

[155] This approach is still employed in several areas to address problems that require formulating a series of steps to accomplish some desired goal (e.g. playing games, analysing legal documents and regulations, and controlling air traffic). Kaplan (n 78) 22, 25.

[156] Based on the idea of capturing expertise in the form of "if-then" rules, the highly specialized (domain specific) expert systems aimed at capturing and duplicating scarce human expertise in computable form by representing the knowledge (i.e., rules and facts) of the domain explicitly, making it available for inspection and modification. AI start-ups created in the 1980s sold expert systems-based software and consulting services to businesses and governmental organizations interested in capturing and better

first conceptualized in the 1960s, the rules-based (or expert system) approach did not gain commercial use until the explosive growth of personal computers and mini-computers that characterized the 1980s.[157] As during the first AI spring, most AI innovation took place in the United States, with Japan's attempts to enter the AI race failing to yield significant results.[158]

Towards the end of the 1980s, however, the business community became increasingly frustrated with the limits of the expert systems approach[159], leading to the second AI winter whose duration coincided with the multilateral trade negotiations taking place at the Uruguay Round.[160] Therefore, when trade officials across the globe were concluding the negotiations of the GATS and of the TRIPS, the first multilateral agreements on trade in services and intellectual property rights, expectations on the practical applications of AI, a technology that could have a potential disruptive impact on services supply and ownership of intellectual property rights, were at the lowest.

Since the establishment of the WTO artificial intelligence has entered a new phase of development, marked by significant advances in conceptual approaches, theories and models (e.g. neural network mathematics)[161], and - most importantly from an international trade perspective - an explosion of AI applications to real-life problems, tasks, and commercially available systems, resulting in a potentially unparalleled

utilizing the capabilities of their own experts. ibid 22–24; Gams, Paprzycki and Wu (n 152) 31; Russell and Norvig (n 90) 23.

[157] Taulli (n 148) ch 1.

[158] ibid.

[159] Expert systems were often narrow and difficult to apply across other categories, and did not learn over time, thus requiring constant updates to the underlying logic models, which added greatly to the costs and complexities. Moreover, as expert systems got larger, managing them and feeding them data became more challenging, leading to increased errors in the outcomes. ibid; Russell and Norvig (n 90) 24.

[160] Taulli (n 148) ch 1.

[161] For example, the work of computer scientists Geoffrey Hinton, Alex Krizhevsky, and Ilya Sutskever on deep learning architecture was instrumental for the increase in task performance that artificial neural networks experienced since the mid-2000s, resulting in the emergence of new AI applications like speech and face recognition. In particular, convolutional neural networks (CNNs), a specific form of multi-layered networks, experienced a massive increase in popularity as a method for computer-based image classification after the 2012 victory of the GPU-powered CNN AlexNet, designed by the Krizhevsky, at the ImageNet Large Scale Visual Recognition Challenge. Alex Krizhevsky, Ilya Sutskever and Geoffrey E Hinton, 'ImageNet Classification with Deep Convolutional Neural Networks' (2017) 60 Communications of the ACM 84; Lee (n 106) 9; Taulli (n 148) ch 1.

transformative impact on the production, sale, consumption, distribution and trade of goods and services. Unlike previous AI eras, when research in the field was mostly confined within the walls of academia, this most recent AI spring experienced a shift in AI pre-eminence, with the private sector taking an increasingly stronger leadership role in AI innovation, as evidenced by the significant investments made in the field by dominant US tech companies like Google, Microsoft, and Facebook that now consider AI a major priority for business development.[162]

Three factors have contributed most significantly to this unprecedented period of technological innovation in AI. First and foremost, the advent of the Internet in the mid-1990s and the resulting development of social networks and other online platforms led to emergence of big data.[163] First coined by NASA in 1997[164], the term 'big data' defines a dataset whose size exceeds a database's ability to acquire, store, manage and analyse data and information.[165] The core of these datasets is based on the '3 Vs' model developed by Laney[166]: an increase in the quantity of data to be processed (volume), coming from a wide heterogeneity of sources (variety) that involves the rapid production and exchange of vast amounts of data in limited time spans (velocity).[167]

The huge volume of data flowing through the web opened the doors to what Lee describes at the 'four waves of AI' in the modern era: (i) Internet AI; (ii) business AI; (iii) perception AI; and (iv) autonomous AI.[168] 'Internet AI', which began around 2005 and went mainstream in 2012, leverages the fact that users automatically label data

[162] Taulli (n 148) ch 1; 'Where Facebook, Apple, Microsoft, Google, And Amazon Are Investing In AI' (*CB Insights Research*, 9 May 2019) <https://www.cbinsights.com/research/facebook-apple-microsoft-google-amazon-ai-investments/> accessed 13 October 2021.
[163] Visvikis and others (n 66) 2631; Lagioia and Sartor (n 22) 290.
[164] Michael Cox and David Ellsworth, 'Application-Controlled Demand Paging for out-of-Core Visualization', *VIS '97: Proceedings of the 8th conference on Visualization '97* (1997).
[165] James Manyika and others, 'Big Data: The next Frontier for Innovation, Competition, and Productivity' (McKinsey Global Institute 2011) 1.
[166] Doug Laney, '3D Data Management: Controlling Data Volume, Velocity and Variety' (2001) META Group Research Note 6.
[167] Other two features characterize big data: veracity (i.e. the accuracy of the data affects the quality of the final result)and value (i.e. the ability to create business opportunities by generating values form the processing of information). Cannataci, Falce and Pollicino (n 19) 1–2.
[168] Lee (n 73) 94; Lee (n 106) 107.

as they browse the web, leading to AI algorithms being deployed primarily as 'recommendation engines' (i.e. systems that tailor content based on the personal preferences they learn from this cascade of labelled data).[169]

The second wave of AI, 'business AI', which started in the mid-2010s, leverages proprietary data, i.e. the huge quantities of data automatically labelled by traditional companies. With the widespread adoption of DL technology, new digital companies started offering their services in the form of AI algorithms that could mine the proprietary data of traditional companies in search of optimization (e.g. to improve fraud detection, make smarter trades, and uncover inefficiencies in supply chains).[170] Unlike Internet AI, whose economic value remained bottled up in the high-tech sector, 'business AI' clustered heavily in industries with large amounts of structured data (i.e. data that have been categorized, labelled, and made searchable), such as the healthcare and financial sectors that naturally lend themselves to data analysis.[171] Notably, though business AI applications have immediate real-world impacts, the AI algorithms continue to traffic purely in digital information mediated by humans.[172]

Characterized by the proliferation of sensors and smart devices that give AI machines human-like senses, blurring the line between the offline and the online world, 'perception AI', the third wave of AI, is not yet in full swing, though the core technologies already exist.[173] As turning the physical world into digital data that can be analysed and optimized requires DL algorithms to vacuum up oceans of data from the real world, concerns about personal data and privacy protection have become a staple in policy discussions related to the implementation of 'perception AI'.[174]

Finally, big data is also expected to play a significant role in the last wave of AI, 'autonomous AI', when machines will be able to make decisions without being

[169] Lee (n 73) 94; Lee (n 106) 107.
[170] Lee (n 106) 111.
[171] ibid 110–111.
[172] ibid 117.
[173] ibid 121.
[174] ibid 117, 124-125.; Cameron F Kerry, 'Protecting Privacy in an AI-Driven World' (*Brookings*, 10 February 2020) <https://www.brookings.edu/research/protecting-privacy-in-an-ai-driven-world/> accessed 13 October 2021.

controlled or operated by a human, unlike automated machines.[175] Though 'autonomous AI' has already raised safety and ethical concerns[176], there may still be a long way to go before robots can replace humans and the roads are filled with self-driving vehicles.

AI improvements fed by the exponential growth of data[177] were also compounded by the vastly increased processing power that comes from using Graphics Processing Units (GPUs)[178] in lieu of Central Processing Units (CPUs).[179] Originally developed for high-speed three-dimensional graphics in computer games, the GPUs increased processing speed to such an extent that computing a model using this chip technology instead of traditional CPUs would take a day or two instead of weeks or even months.[180] This proved particular important for AI machines build on DL architecture. Indeed, repurposing GPUs for the repetitive training required for deep neural networks meant that deep learning AI technology, whose implementation to real-life problems and tasks had been stunted for decades by the lack of affordable and efficient computing power, could be used to learn to unlock the value trapped in vast volumes of data, thus enabling the private sector to finally exploit its commercial potential.[181]

In addition to the exponential growth in data volumes and the increase in computing power, which helped resuscitate the field of neural networks[182], AI has also benefited

[175] Lee (n 73) 94; Lee (n 106) 129.
[176] Patrick Lin, Keith Abney and Ryan Jenkins, *Robot Ethics 2.0: From Autonomous Cars to Artificial Intelligence* (Oxford University Press 2017).
[177] As computer scientist Barry Smyth says: "Data is to AI what food is to humans." NITI Aayog (n 71) 12–15; Lee (n 106) 9.
[178] Invented in 1999 by Nvdia, a company specialized in graphic processing for computer games, GPUs have become the dominant chips technology in the modern AI era. Nvidia GPUs have replaced Intel chips, which worked well in the desktop era and allowed for the maximization of processing speed and high-resolution graphics over power consumption, and Qualcomm chips, which were best suited for the smartphone era, when demand shifted towards a more efficient use of power. As testimony of the leadership role Nvidia has come to play in modern AI, the company's stock price multiplied by factor of ten between 2016 and 2018 alone. Lee (n 106) 96–97.
[179] ibid 9; NITI Aayog (n 71) 14.
[180] Taulli (n 148) ch 1.
[181] Du-Harpur and others (n 111) 425; NITI Aayog (n 71) 12–15.
[182] The neural network approach yielded positive results in 1950s and 1960s, when it was first conceptualized, but became almost entirely out of fashion in the 1970s due to the lack of adequate practical results. Lee (n 106) 8.

from the huge fall in cost of data storage and other advances in AI infrastructure.[183] For example, in the last four decades the hard drive cost per gigabyte of data has been falling exponentially, enabling companies to store huge amounts of data without incurring in astronomically high costs.[184] Also, the work done by Google to build scalable systems in an effort to efficiently index the ever increasing Web has led to an innovation in commodity server clusters, virtualization, and open source software, which play a key role in AI development.[185]

From the historical overview of artificial intelligence, it clearly emerges that, whilst this technology could be considered as 'emerging' with respect to its applicability to solving real-life problems, AI is not a novel concept. Finding its genesis in the early 1950s, AI can hardly be considered a new technology. However, AI innovation has been confined for decades to the realm of theories, concepts, and abstract hypothesis, gaining limited visibility outside academia. Indeed, while during this 'age of discovery'[186] a handful of elite thinkers clustered in North America led to major theoretical breakthroughs (e.g. deep learning), AI was barely considered viable for commercial purposes. However, when advances in computing power and the growth of big data eventually allowed for decades of promising research to turn into real-life applications and sustainable businesses[187], AI experienced an unprecedented growth and acquired the widespread visibility that warrant the label of 'emerging' technology, attracting the interest of governments and the business community that have come to consider AI a priority for policy and investment.

Shifting from the 'age of discovery' to the 'age of implementation'[188] is likely to have important policy implications, including for the regulation of trade in AI-powered services, as the world's two trade powerhouses, China and the United States, battle it out for the role of AI superpower. In the XX century AI expertise, which the US had

[183] ibid 9; NITI Aayog (n 71) 14.
[184] The cost per gigabyte has shrank from half a million US dollars in 1980 to 2 cents in 2017. NITI Aayog (n 71) 14.
[185] Google was also one of the early adopters of deep learning, with the launch of the "Google Brain" project in 2011. Taulli (n 148) ch 1.
[186] Lee (n 106) 12–14.
[187] ibid.
[188] ibid.

aplenty, mattered the most in AI research, thus placing this country in a position of dominance in the field. However, in the age of implementation access to huge quantities of data becomes decisive for AI development, placing China with its abundance of (local) data at a clear advantage over the United States.[189] Thus, the transition from the 'age of expertise' to the 'age of data'[190]could have significant repercussions on AI regulation since the two governments that aspire to lead the AI race have markedly diverging views on a number of AI-related issues (e.g. privacy, cybersecurity, intellectual property rights).

2.5 AI key components and distinctive features

Like most technologies underpinning the digital economy, AI relies on the interaction between three key elements: data, algorithms, and microprocessors. As Sen points out, there is a general lack of clarity as to the meaning of 'data', which is often confused with 'information'.[191] Indeed, the Merriam-Webster Dictionary defines 'data' as "factual information (such as measurements or statistics) used as a basis for reasoning, discussion or calculation", "information in digital form that can be transmitted or processed", and "information output by a sensing device or organ that includes both useful and irrelevant or redundant information and must be processed to be meaningful".[192] Data in the context of international trade law can be understood as referring to "information in digital form".[193] A more nuanced approach distinguishes between 'data' as "unprocessed facts" and 'information' as data that are "processed, organized, structured or presented in a meaningful or useful manner".[194] For the purposes of this study, three key aspects of data are particularly relevant: (i) there exist different categories of data (e.g. personal data, non-personal data, sensitive data, open data and/or business data); (ii) data travels through the Internet – a global

[189] ibid.
[190] ibid.
[191] Nivedita Sen, 'Understanding the Role of the WTO in International Data Flows: Taking the Liberalization or the Regulatory Autonomy Path?' (2018) 21 Journal of International Economic Law 323, 325.
[192] Merriam-Webster.com, 'Data' <https://www.merriam-webster.com/dictionary/data> accessed 15 October 2021.
[193] Sen (n 191) 325.
[194] Aaronson and Leblond (n 24) 248, footnote 12.

network of computers – across different jurisdictions; and (iii) data are assets that can be traded.[195]

In order for AI systems to function and perform, AI models need to be fed three distinguished sets of data: (i) the training set, which is used to train AI models to learn how to recognize patterns among features and evaluate the accuracy of each selection; (ii) the validation set, which are used to estimate errors rates of the various models and verify the extent to which the algorithm learning process has been successful and the predictions are accurate; and (iii) the test set, which is used to report the accuracy of the selected model.[196] As Lagioia and Sartor point out, AI systems can use all kind of information, especially personal data, to analyse, forecast and influence human behaviour, thus transforming data into valuable commodities.[197]

AI developers require access to massive amounts of good-quality data for AI machines to work properly and execute their tasks: the more data AI systems can access and the higher the quality of said data, the better the performance of these systems is likely to be.[198] Therefore, AI innovation and the widespread use of this technology go hand in hand with an increase in the availability of electronic data - a by-product of using any kind of information and communication technology (ICT) system – and their free flow across borders.[199] Consequently, laws and regulations that may affect the ability of AI developers to get access to and process big data across different jurisdictions can be particularly relevant for artificial intelligence.

Another key component of AI systems are the algorithms that are used to process and analyse the data that are inputted into the machine. An AI algorithm contains all the necessary steps that a machine is required to undertake to perform a task. Since algorithms are considered akin to mathematical equations and, therefore, unlikely to

[195] Francesca Casalini and Javier López González, 'Trade and Cross-Border Data Flows' (OECD Publishing 2019) OECD Trade Policy Papers, No. 220 9; Aaronson and Leblond (n 24) 248.
[196] Hyunjong Ryan Jin, 'Think Big: The Need for Patent Rights in the Era of Big Data and Machine Learning Notes' (2017) 7 New York University Journal of Intellectual Property & Entertainment Law (JIPEL) 78, 91–92.
[197] Lagioia and Sartor (n 22) 291.
[198] Aaronson, 'Data Governance, AI, and Trade: Asia as a Case Study' (n 31) 2.
[199] Lagioia and Sartor (n 22) 290.

be protected by patents, the valuable information they contain may only be protected as trade secrets.[200] However, for trade secret protection to adequately work, the protected information must remain confidential and should not be disclosed to third parties.[201] Since the AI environment is characterized by a more open-source attitude, it could be more vulnerable to trade secrets violation.[202] Thus, the emergence of artificial intelligence in the XXI century may force a reconsideration of existing multilateral rules on trade-related aspects of IP, if they prove unable to protect a crucial aspect of the AI technology. The treatment of AI under the TRIPS, however, falls outside the scope of this research.

Microprocessors constitute the third key component of AI technologies. While most digital technologies use standard microprocessors, or CPUs, AI systems need the higher processing power that, in the last decade, GPUs have been able to provide. However, prompted by the AI-driven escalation in demand for GPUs, some technology providers are aiming to develop AI-specific microprocessors that are inspired by GPUs but are engineered for AI at the outset.[203] This may prompt governments to introduce discriminatory measures aimed at increasing the competitiveness of the domestic producers of AI-specific microprocessors to win the AI race. Thus, on the one hand, AI could have an impact trade in information technology (IT) products and, on the other, measures affecting trade in goods could have an impact on the development and use of AI, including its applications in the services sector. However, the treatment of goods, including IT products, under the GATT falls outside the scope of this research.

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[200] Woodrow Barfield and Ugo Pagallo, *Advanced Introduction to Law and Artificial Intelligence* (Edward Elgar Publishing 2020) 171–172.
[201] Ibid 171-172.
[202] Taulli (n 148).
[203] Google was the first to develop custom-developed application-specific integrated circuits (ASICs) used to accelerate machine learning workloads. They are known as tensor processing units (TPUs). Microsoft has started to use field programmable gate arrays (FPGAs). Facebook, Amazon, and China's Baidu are also exploring a wide range of chip technologies that can drive AI forward. 'Cloud Tensor Processing Units (TPUs)' (*Google Cloud*) <https://cloud.google.com/tpu/docs/tpus> accessed 16 October 2021; James Hayes, 'Deep as Chips: The New Microprocessors Powering AI' (*E&T Engineering and Technology*, 11 November 2020) <https://eandt.theiet.org/content/articles/2020/11/deep-as-chips-the-new-microprocessors-powering-ai/> accessed 15 October 2021; Cade Metz, 'How AI Is Shaking Up the Chip Market' [2016] *Wired* <https://www.wired.com/2016/10/ai-changing-market-computer-chips/> accessed 16 October 2021.

Peng, Lin and Streinz argue that besides data and algorithms, the development of AI rests also on the interaction between other two components: humans and machines.[204] These two key components of AI and how they connect to one another are especially important in the trade in services context. As a matter of fact, the key feature that distinguishes AI from other existing digital technologies is the link between cognitive capabilities and computer programs and, more specifically, the relationship between human-based services and AI machines. For AI developers the primary goal is designing a technology that enables machines to perform tasks that humans traditionally undertake, to operate without the need for human intervention or supervision, and make decisions independently.[205] In other words, what distinguishes AI from other digital technologies is "its ability to act autonomously".[206]

Considering that services are typically supplied either by a juridical or a natural person, AI has the potential to impact not only the type of services that can be offered but it can also affect services suppliers. Two scenarios could unfold. In the first, AI machines 'substitute' humans in the provision of certain services. For example, for some bookkeeping tasks accountants could be replaced by AI systems. The potential 'replacement' of natural persons by computers programs powered by AI technology as service suppliers may warrant a reconsideration of the concepts of 'mode of supply' and 'service supplier' used in the trade in services normative framework.[207]

In the second scenario, under certain conditions, AI machines 'outperform' humans, executing specific tasks in an optimal manner with remarkable performance, precision, and efficiency beyond the reach of their human counterparts.[208] For instance, some scholars argue that with recent advances in artificial neural networks systems some AI machines can outperform humans at many recognition tasks.[209] Case in point is a deep-learning algorithm that, after being fed over one hundred thousand images of

[204] Peng, Lin, Ching-Fu and Streinz (n 29) 4.
[205] Kaplan (n 78) 147.
[206] Matthew U Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies and Strategies' (2016) 29 Harvard Journal of Law & Technology 353, 363.
[207] See Chapter 5 for an in-depth discussion on this issue.
[208] Liu, Han-Wei and Lin, Ching-Fu (n 33) 418.
[209] Kaplan (n 78) 30.

malignant melanomas and benign moles, outperformed a majority of 58 international dermatologists in the detection of skin cancer.[210]

This is mainly ascribable to the ability of AI computer programs to process far larger quantities of information in a much shorter periods of time than any human being.[211] This difference in capabilities between AI machines and natural persons could also result in the former being able to execute certain tasks that human beings would be unable to undertake (e.g., finding patterns between vast amounts of images in a limited period of time). This, in turn, could open up opportunities for the creation of 'new' services that were not feasible or conceivable before AI was applied to real life problems and, in particular, before the GATS was negotiated and agreed upon during the Uruguay Round.[212]

2.6 AI applications

Research in artificial intelligence has focused primarily on developing machines that can mirror key components of human intelligence: learning, reasoning (i.e. drawing inferences appropriate to the situation), problem solving (i.e. systematic search through a range of possible actions in order to reach some predefined goal or solution), perception (i.e. scanning the environment by means of various sensory organs, real or artificial, and decomposing the scene into separate objects in various spatial relationships), and using language.[213] In practice, AI developers are aiming at designing machines that can process natural language, analyse patterns, recognise speech and physical features, manipulate objects, store knowledge, and make predictions based on probabilistic reasoning, and make decisions without human supervision.[214] The most recent crop of AI applications, enabled primarily by the use

[210] OECD, *Artificial Intelligence in Society* (n 79) 63; VJ Mar and HP Soyer, 'Artificial Intelligence for Melanoma Diagnosis: How Can We Deliver on the Promise? - Annals of Oncology' (2018) 29 Annals of Oncology 1625, 1625.
[211] The key factor that allow IBM's Watson – a supercomputer that uses AI technology - to win at Jeopardy against the TV quiz show's champions Ken Jennings and Brad Rutter in 2011 was its data processing speed: most Jeopardy champions know the answer to most clues most of the time but it may take them some time to figure it out. Kaplan (n 78) 43.
[212] See Chapter 5 for an in-depth discussion on this issue.
[213] Copeland (n 73).
[214] Russell and Norvig (n 90) 2.

of artificial neural networks and deep learning, include computer vision, automated-decision-making, and natural language processing (NLP). Robotics, which refers to mechanical, computer-controlled systems that can perform a variety of different tasks, is also considered a field of application of artificial intelligence.[215]

2.6.1 AI applications in the services sector

Because of its capabilities, in the last 5-10 years AI has found relatively widespread applicability to a variety of problems and in a broad range of sectors. AI has been used for both non-commercial and commercial purposes. For example, AI has been deployed in criminal justice for predictive policing and assessing reoffending risk and facial-recognition technologies are increasingly being used by law enforcement for surveillance purposes.[216] Scientists use AI to collect and process large-scale data, help reproduce experiments at lower cost, and accelerate scientific discovery.[217] As many AI technologies are dual-use, they can be incorporated also in military applications, as evidenced by the raising concerns about the development of autonomous weapon systems. [218] Although AI applications for non-commercial purposes may have significant normative and regulatory implications in numerous fields of law, they fall outside the scope of this research.

As regards AI applications for commercial purposes, they extend to all sectors of the economy. In agriculture, AI systems can be used to manage and monitor soil and crop, control pests and prevent diseases. [219] Collaborative, self-programming, and autonomous robots – based on AI-technologies – are increasingly being used in the

[215] Ralf T Kreutzer and Marie Sirrenberg, *Understanding Artificial Intelligence: Fundamentals, Use Cases and Methods for a Corporate AI Journey* (Springer International Publishing 2020) 23.
[216] OECD, *Artificial Intelligence in Society* (n 79) 16; Denise Almeida, Konstantin Shmarko and Elizabeth Lomas, 'The Ethics of Facial Recognition Technologies, Surveillance, and Accountability in an Age of Artificial Intelligence: A Comparative Analysis of US, EU, and UK Regulatory Frameworks' [2021] AI and Ethics.
[217] OECD, *Artificial Intelligence in Society* (n 79) 16.
[218] Ángel Gómez de Ágreda, 'Ethics of Autonomous Weapons Systems and Its Applicability to Any AI Systems' (2020) 44 Telecommunications Policy 101953; Russell and Norvig (n 90) 31.
[219] Ngozi Clara Eli-Chukwu, 'Applications of Artificial Intelligence in Agriculture: A Review' (2019) 9 Engineering, Technology & Applied Science Research 4377; Kirtan Jha and others, 'A Comprehensive Review on Automation in Agriculture Using Artificial Intelligence' (2019) 2 Artificial Intelligence in Agriculture 1.

manufacturing sector, contributing to the development of the so-called smart factory or Industry 4.0.[220] Lastly, the services sector is greatly benefiting from the recent innovations in the AI field, with this technology increasingly being used in a variety of services, including finance, healthcare, educational, transport, and business services.

Finance is knowledge-intensive and, thus, one of the first sectors to benefits from the advances in AI. This technology can well respond to the needs of a sector where everyday activities involve the analysis of large amounts of information (e.g. digesting market information), the gleaning of patterns and insights from quantitative information (e.g. interpreting market trends and forces), and the consequent creation of outputs and results (e.g. investment advice).[221] In the financial services sector, numerous large companies and several start-ups are rapidly deploying AI in five key areas: (i) credit-scoring; (ii) financial technology (FinTech) lending; (iii) fraud detection; (iv) automated trading; and (v) automated asset management (robo-advisors).[222] Financial services suppliers can employ AI to assess credit-worthiness, using statistical analysis to assess the possibility that borrowers could default on their debt obligations.[223] Neural network techniques, in particular, have been instrumental in enabling the fine-grain analysis of vast quantities of data collected from credit reports, with some reports showing that DL techniques can improve the accuracy of predictions by up to 15%.[224] For example, the start-up GiniMachine developed an AI-based platform that enables comprehensive creditworthiness check with the purpose of reducing default rates on consumer and corporate loans.[225] AI has also been employed in lending services. By leveraging traditional credit report data (e.g. payment history, amounts owed, length of history, and number of accounts) compounded with alternative data sources (e.g. insurance claims, social media activities, online shopping information, shipping data from postal services, browsing patterns, and type of telephone or browser used), AI-based FinTech platforms can help facilitate access to

[220] Kreutzer and Sirrenberg (n 215) 88, 97.
[221] Sean Stein Smith, *Blockchain, Artificial Intelligence and Financial Services: Implications and Applications for Finance and Accounting Professionals* (Springer International Publishing 2020) 88.
[222] OECD, *Artificial Intelligence in Society* (n 79) 16, 55; Kreutzer and Sirrenberg (n 215) 213.
[223] OECD, *Artificial Intelligence in Society* (n 79) 55.
[224] ibid.
[225] Kreutzer and Sirrenberg (n 215) 213.

credit for those with short credit history and lower the costs usually associated with lending.[226] Financial companies also use AI technologies to detect fraud, using ML techniques for real-time monitoring and pattern behaviour analysis to identify anomalies immediately and trigger reviews on potentially fraudulent activities.[227] Algorithmic trading is another major application of artificial intelligence in financial services. Defined as the use of computer programs to automate one of more stages of the trading process (i.e. data analysis, buy and sell recommendations, and trade execution)[228], algorithmic trading – also known as high frequency trading (HFT)[229] - rose in popularity between the mid-2000s and the early 2010s, although concerns remain as to increased market fragility and volatility associated with an aggressive use of this AI tool.[230] Lastly, some financial companies use AI in asset management to supply investment advice tailored to each investor's individual goals and risk appetite.[231] Deutsche Bank, for example, offers this service though ROBIN, its algorithm-based, automated asset management system.[232]

Like finance, health services are knowledge-intensive, with health professionals, biomedical research and patients producing vast amounts of data from an array of devices (e.g. electronic health records (EHRs), genome sequencing machines, and high-resolution medical imaging).[233] AI systems can use these data to improve therapies and practices, diagnose and prevent disease and outbreaks early on, discover treatments and drugs, propose tailored interventions and power self-monitoring tools.[234] For example, by rapidly processing a variety of complex datasets

[226] OECD, *Artificial Intelligence in Society* (n 79) 56; Julapa Jagtiani and Catharine Lemieux, 'The Roles of Alternative Data and Machine Learning in Fintech Lending: Evidence from the LendingClub Consumer Platform' (2019) 48 Financial Management 1009, 1.
[227] OECD, *Artificial Intelligence in Society* (n 79) 57–58.
[228] Giuseppe Nuti and others, 'Algorithmic Trading' (2011) 44 Computer 61.
[229] AI systems allow for the analysis of a wide variety of market factors in real-time to make investment decisions in milliseconds, thus enabling traders to exploit global price and knowledge differences to optimize investments. The use of AI-based systems makes it possible to carry out millions of transactions per day. Kreutzer and Sirrenberg (n 215) 214.
[230] OECD, *Artificial Intelligence in Society* (n 79) 58; Rena S Miller and Gary Shorter, 'High Frequency Trading: Overview of Recent Developments' (Congressional Research Service 2016) 1, 6.
[231] Kreutzer and Sirrenberg (n 215) 213.
[232] ibid.
[233] OECD, *Artificial Intelligence in Society* (n 79) 61–62.
[234] ibid 16, 61–62.

that could include a patient's health records, physiological reactions and genomic data, artificial intelligence could be instrumental in providing medical treatment that is tailored to the characteristics of the patient (i.e. precision medicine).[235] Image diagnostic is one of the fields of medicine where AI algorithms can be put best at use, as evidence suggests that they can equal, if not exceed, doctors at diagnosing numerous conditions.[236]

AI can also be applied in education services. AI systems can be used to personalise learning, by identifying pedagogical materials and customising learning based on students' individual needs and strengths.[237] Evidence suggests that these tools can be employed to support the supply of education services across all age groups, from primary education to adult education.[238] AI systems can be used also for online, blended and language learning, for example through automated image and facial recognition systems that can support teachers in monitoring exams, intelligent tutoring systems (ITS) and AI-powered chatbots that can provide students and teachers with analytics on their learning, and NLP-based systems that can help with the teaching of foreign languages through speech recognition.[239]

AI can be deployed also in a variety of business services, including legal, marketing and advertising services, and transport services. For example, it is projected that, in the next 5 to 10 years, some services usually provided by paralegals and (junior) lawyers could be supplied by ALATs, which include specialized standalone technologies (e.g. legal chatbots), enablers of legal advice (e.g. automated document review), further enablers of legal advice (e.g. legal data analytics) and human-free smart contracts.[240] In marketing and advertising, the ability of AI systems to mine and process large quantities of data on consumer behaviour can be exploited to target and

[235] ibid 62; Inke R König and others, 'What Is Precision Medicine?' (2017) 50 European Respiratory Journal 2.
[236] Russell and Norvig (n 90) 30.
[237] Stéphan Vincent-Lancrin and Reyer van der Vlies, 'Trustworthy Artificial Intelligence (AI) in Education: Promises and Challenges | En | OECD' (OECD Publishing 2020) OECD Education Working Papers No. 218 7.
[238] ibid 8; Kreutzer and Sirrenberg (n 215) 182–184.
[239] Kreutzer and Sirrenberg (n 215) 180–181; Vincent-Lancrin and van der Vlies (n 237) 9.
[240] Liu, Han-Wei and Lin, Ching-Fu (n 33) 421.

personalise content, recommend goods and services to purchase, and optimize advertising campaigns prices.[241] In the transport sector, advances in the design and creation of autonomous vehicles with virtual driver systems, high-definition maps and optimised traffic routes could lead to a shift from human-driven to AI machine-driven road transport services like car-sharing or taxi services.[242]

2.6.2 AI-powered Services

Different terms have been coined to describe the application of AI technologies to the services sector. For example, some scholars use 'AI-enabled services', 'AI-based services' or 'AI-powered services' to identify services that rely on or are driven by AI technology.[243] Others refer to 'Al as a service' (AlaaS) to describe cloud-based systems that provide on-demand services to organizations and individuals to deploy, develop, train, and manage AI models, and comprise AI software services (i.e. ready-to-use AI applications and building blocks), AI developer services, (i.e. tools and frameworks for developers to bring out AI capabilities), and AI infrastructure services (i.e. the raw computational power for building and training AI algorithms).[244] For the purposes of the analysis, this study uses the label 'AI-powered services' to refer to services that are operated by AI technology, including those that may fall under the definition of AIaaS.

2.7 Advantages, challenges, and risks of artificial intelligence

Artificial intelligence is advantageous for several reasons. AI systems provide effectiveness, simplicity and celerity in solving a multitude of problems by handling vast amounts of multi-dimensional and multi-variety data that they can quickly process to perform tasks generally associated with human thinking and human labour, and identifying trends and patterns faster and more easily than humans.[245] As a result, this

[241] OECD, *Artificial Intelligence in Society* (n 79) 16.
[242] ibid.
[243] Peng, Lin, Ching-Fu and Streinz (n 29); Chander (n 32); Irion (n 34); Liu, Han-Wei and Lin, Ching-Fu (n 33).
[244] Sebastian Lins and others, 'Artificial Intelligence as a Service' (2021) 63 Business & Information Systems Engineering 441, 442–446.
[245] Chhaya A Khanzode and Ravindra D Sarode, 'Advantages and Disadvantages of Artificial Intelligence and Machine Learning: A Literature Review' (2020) 9 International Journal of Library & Information

technology allows to make predictions, recommendations or decisions with greater accuracy and at a lower cost.[246] Moreover, AI has the potential to free humanity from menial repetitive work and dramatically increase the production of goods and services.[247]

There are sector-specific advantages to the use of this technology. For example, AI can enable customers to receive more credit at better conditions when applied in financial services, it can improve research productivity and enable novel forms of discovery in the research and development (R&D) field, it can help optimise clinical decision-making and contribute to the emergence of tele-health and enhance the efficiency and quality of many public sector procedures in the public sector.[248]

Various stakeholders can benefit from the use of artificial intelligence. Producers and service suppliers are likely to benefit from the increased automation, the generation of productivity gains, the reduction in transaction costs and the enabling of services that were unprofitable, unaffordable, or unfeasible in other circumstances associated with the use of AI technologies.[249] Consumers, on the other hand, could benefit from the personalisation and customisation of services, which would reduce decision-fatigue and time wasted researching available options, as well as from the emergence or greater differentiation of services that could better respond to their needs.[250] But AI could also be beneficial for society at large, as ML and DL-based technologies (and potentially AGI in the long distant future) could be deployed to address some existing

Science 30, 34–35; Teresa Rodríguez de las Heras Ballell, 'Legal Challenges of Artificial Intelligence: Modelling the Disruptive Features of Emerging Technologies and Assessing Their Possible Legal Impact' (2019) 24 Uniform Law Review 302, 306.

[246] OECD, *Artificial Intelligence in Society* (n 79) 15.

[247] Russell and Norvig (n 90) 31.

[248] OECD, *Artificial Intelligence in Society* (n 79) 55, 58–59, 61, 70.

[249] Teresa Rodríguez de las Heras Ballell, 'Legal Challenges of Artificial Intelligence: Modelling the Disruptive Features of Emerging Technologies and Assessing Their Possible Legal Impact' (2019) 24 Uniform Law Review 302, 306; OECD, *Artificial Intelligence in Society* (n 79) 15.

[250] Stefano Puntoni and others, 'Consumers and Artificial Intelligence: An Experiential Perspective' (2021) 85 Journal of Marketing 131, 132; OECD, *Artificial Intelligence in Society* (n 79) 58.

global problems, playing a crucial role in the fight against climate change or large-scale disease outbreaks like the COVID-19 pandemic.[251]

Notwithstanding the potential advantages and benefits associated with the use of artificial intelligence, there are several concerns, issues and risks associated with the nature, functioning and use of this technology that have prompted multiple actors, including governments, international organisations, the civil society and the business community, to consider the need for designing and adopting AI-specific regulation aimed at neutralising, minimising, or mitigating their impact, as detailed in Chapter 4 of this study. Some of these issues and challenges are specific to AI (e.g., bias, opacity, accuracy). Others are common to most digital technologies but may be especially relevant for AI (e.g., privacy, cybersecurity, and access to data).

A major concern associated with the development and use of artificial intelligence is the risk of bias and discrimination.[252] Algorithmic bias can originate from pre-existing biases from the data used to train AI algorithms, inadequate methodological approaches, or embedded social factors.[253] When input data is not sufficiently diversified, lacks certain types of data, is not adequately representative of the population, or mirrors historical biases, AI systems can lead to discriminatory outcomes.[254] When AI developers (un)wittingly incorporate their biases in the coding of algorithms, the resulting outcome may also reflect said biases and lead to algorithmic unfairness, whereby someone becomes subject to unjustified prejudice resulting from automated processing.[255] Algorithmic bias could have a significant impact on services that rely on AI technology, with potentially dangerous

[251] Dafoe (n 39) 6; Soprana, Marta, 'Leveraging ICT-Enabled Services for Trade in Times of Pandemic: The Case of AI-Enabled Health Services' (UNESCAP 2020) 4 <https://www.unescap.org/sites/default/files/144%20Final-Marta%20Soprana-Switzerland.pdf>.
[252] Nizan Geslevich Packin and Yafit Lev-Aretz, 'Learning Algorithms and Discrimination' in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar Publishing 2018); Russell and Norvig (n 90) 31.
[253] Roel Dobbe and others, 'A Broader View on Bias in Automated Decision-Making: Reflecting on Epistemology and Dynamics' [2018] arXiv:1807.00553 1; Shahriar Akter and others, 'Algorithmic Bias in Data-Driven Innovation in the Age of AI' (2021) 60 International Journal of Information Management 102387, 5. Lagioia and Sartor (n 22) 295–296.
[254] Packin and Lev-Aretz (n 252) 96.
[255] Lagioia and Sartor (n 22) 300.

consequences in certain circumstances. For example, an AI system used to recommend treatment in the health sector may lead to misdiagnosis and, in the worst-case scenario, death, if its training data was not representative of the patients seeking treatment.[256]

Another key issue related to the use of artificial intelligence regards the lack of transparency in the process through which AI algorithms operate and deliver their outcomes.[257] The high level of complexity in the design and operation of AI algorithms, especially those based on deep learning and artificial neural networks, adds opacity to the internal processing of the autonomous system and conceals the relevant criteria for the decision-making and the procedural aspects of the algorithmic decisions, resulting in a reduction in the comprehensibility of the outcomes.[258] Pasquale coined the term 'black box AI' to describe autonomous systems that deploy "algorithms which are either similarly inaccessible, or so complex that they cannot be reduced to a series of rules and rule applications comprehensible to the data subject".[259] Some scholars have framed this lack of transparency as an issue of limited explainability, highlighting how determining the functioning of complex technological systems and the rationale behind their decisions-making process can be costly, and not always fully feasible to the whole extent.[260] Others have linked it to the issue of foreseeability or lack of predictability, arguing that AI systems can engage in activities or generate solutions that their original programmers may not have intended or expected.[261] Overall, 'black box AI' is problematic for two reasons. On the one hand, the interaction with opaque AI systems may affect individual autonomy, as decisions remain unexplained and are

[256] OECD, *Artificial Intelligence in Society* (n 79) 63–64.
[257] Jenna Burrell, 'How the Machine "Thinks": Understanding Opacity in Machine Learning Algorithms' (2016) 3 Big Data & Society 2053951715622512.
[258] Rodríguez de las Heras Ballell (n 249) 308.
[259] Frank Pasquale, 'Normative Dimensions of Consensual Application of Black Box Artificial Intelligence in Administrative Adjudication of Benefits Claims | Law and Contemporary Problems' (2021) 84 Law and Contemporary Problems 35, 36; Frank Pasquale, *The Black Box Society: The Secret Algorithms That Control Money and Information* (Reprint edition, Harvard University Press 2015).
[260] Ryan Abbott, *The Reasonable Robot: Artificial Intelligence and the Law* (Cambridge University Press 2020) 32; Rodríguez de las Heras Ballell (n 249) 309.
[261] Abbott (n 260) 33; Scherer (n 206) 364.

thus unchallengeable.[262] On the other, opaque AI systems represent a significant liability and may heighten the risk of biases, misdiagnosis, or error.[263]

Algorithmic opacity may also explain the public's hesitancy in trusting AI systems[264], a concern that may be particularly significant for the services sector. Indeed, it may be difficult to supply AI-powered services if consumers or end-user prefer to put major decisions in the hands of humans rather than machines, or decide not to follow decisions, predictions or recommendations provided by AI systems.[265] Likewise, if consumers or end users are unable to ascertain whether the service provider is a machine or a human, they may decide against engaging the services of said supplier. For example, the use of AI-based telehealth services may be hampered by the lack of trust patients may have in receiving a preliminary diagnosis by a chatbot rather than a doctor.

Trust in AI systems is also undermined by concerns about the accuracy of AI predictions and potential errors, especially as some advanced AI techniques (e.g., deep learning) are increasingly being used in high-stakes, safety-critical applications.[266] The higher the quality and the larger the amount of training data available to an AI machine, the more accurate its predictions can be. In turn, greater accuracy leads to fewer errors and higher reliability of the AI system. On the other hand, insufficient, inaccurate, or biased data compromise the performance of AI systems.[267] This is especially troublesome in services sectors where errors can have fatal consequences (e.g., misdiagnosis that leads to physical harm or death of a patient) or damages to public or private property (e.g., error in driving that leads a self-driving car to crash into a lamppost or another car).

[262] Lagioia and Sartor (n 22) 301.
[263] Soprana, Marta, 'Leveraging ICT-Enabled Services for Trade in Times of Pandemic: The Case of AI-Enabled Health Services' (n 251) 6.
[264] Philipp Schmidt, Felix Biessmann and Timm Teubner, 'Transparency and Trust in Artificial Intelligence Systems' (2020) 29 Journal of Decision Systems 260, 260.
[265] ibid 261.
[266] Russell and Norvig (n 90) 32.
[267] Rodríguez de las Heras Ballell (n 249) 310.

The increased use of artificial intelligence also raises concerns about potential invasions of privacy and misuse of personal data. Like all digital technologies, AI relies on data to function and, as Lagioia and Sartor point out, "the quest for data generates pressures for the collection of personal data".[268] Unlike other technologies, however, AI poses a specific threat to personal data: under certain circumstances AI systems can re-recreate personal profiles even when exclusively fed non-personal data, as deep learning algorithms are able to find connections among features that elude the human mind and retrace and de-anonymise data about persons.[269] Moreover, algorithmic opacity combined with the ability of AI systems to extract information beyond the control of individuals, makes it extremely challenging to obtain consent to the treatment of personal data or comply with transparency requirements for the exercise of the rights of data subjects.[270]

Additional concerns have been raised with respect to cyber-security and the potential vulnerability of AI algorithms to cyber-attacks, and issue that affects all digital technologies but that can be particularly significant for AI.[271] Indeed, when AI is implemented to make high-stake decisions, its vulnerability to cyberattacks can have important repercussions.[272] For example, when AI is used to assess credit-worthiness or for diagnostics purposes, breaches in cybersecurity could lead to companies being wrongly denied business-saving loans or people being misdiagnosed, with potential deadly consequences. Likewise, since numerous AI applications are dual-use, a country's national security could be put at risk, if an adversary were to alter the behaviour of AI systems employed for both civil and military purposes, through the manipulation of training data or preferences and trade-offs encoded in utility models.[273]

[268] Lagioia and Sartor (n 22) 291.
[269] European Commission, 'EU White Paper on Artificial Intelligence' (n 69) 11.
[270] Lagioia and Sartor (n 22) 300; Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 325.
[271] Rodríguez de las Heras Ballell (n 249) 310.
[272] Thomas G Dietterich and Eric J Horvitz, 'Rise of Concerns about AI: Reflections and Directions' (2015) 58 Communications of the ACM 38, 39.
[273] ibid.

2.8 Concluding remarks

If the term 'emerging' is used to describe digital technologies that started to exist at the turn of the XXI century[274], its application to artificial intelligence may be somewhat misguided. With its origins dating back to the early 1950s and the first attempts at commercialisation of expert systems-based applications occurring already in the 1980s, artificial intelligence could be hardly characterised as 'new' or novel when trade negotiators were engaged in the Uruguay Round negotiations and the establishment of the WTO in the early 1990s. Yet, it encompasses quite a broad variety of methods and technologies that have developed over the past six decades, with some of the most recent innovations in AI, such as neural networks-based deep learning, qualifying as 'new' compared to AI systems in the 1980s-early 1990s.

It is this combination of old and new that can create problems in the interpretation of the applicability of multilateral trade rules negotiated between 1986 and 1994. Indeed, while some could argue that, since AI dates back to the 1950s, AI-powered services are likely covered by the GATS, others could contend that, since this technology was relatively unknow outside academia in the early 1990s, Uruguay Round negotiators may have been unaware of AI and its potential commercial applications when they scheduled their commitments under the GATS. They could also contend that deep learning or other recent AI methods and technologies led to the creation of new AI-powered services that are unlikely to fall under the purview of the GATS, since they did not exist or were not technically feasible when WTO Members undertook their GATS commitments and obligations.

The evolving nature of AI raises additional concerns. Should there be a universally-agreed definition of AI in order to offset interpretative issues arising from the use of a term that can refer to a rather broad range of technologies and methods that evolve over time? Considering that, notwithstanding important advances and theoretical breakthroughs in the field, weak AI is still predominant and likely to continue prevail

[274] Oxford Advanced Learner's Dictionary, 'Emerging' <https://www.oxfordlearnersdictionaries.com/definition/english/emerging> accessed 12 November 2021.

in decades to come, what approach should policymakers take when designing AI regulation and AI-relevant digital trade rules? Should they lean towards a short-medium-term horizon approach that best responds to the current needs and issues arising from the use of weak AI, or should they adopt a forward-thinking and flexible approach, in order to ensure they can accommodate potential future developments towards strong AI and AGI and that these disciplines hold the test of time? Should new legal frameworks allow flexibility to accommodate different approaches to defining AI, in order to capture the shifting landscape of technology, as some scholars suggest?[275]

The brief historical overview of artificial intelligence has shown how this technology did not evolve in a straight line, but rather experienced successes and busts in waves, with technological advances and setbacks in data, computing power and algorithms playing a key role in the rise of AI springs and descents into AI winters, respectively. However, as AI becomes increasingly deployed across all sectors of the economy, including services, and concerns about the risks associated with its use augment, questions arise as to whether and to what extent policy decisions may also influence AI innovation. Moving forward, as this technology grows increasingly intertwined with the production, distribution, sale, and marketing of digital products and services, efforts to regulate official intelligence are likely to become more relevant under international trade law.

[275] Liu, Han-Wei and Lin, Ching-Fu (n 33) 418.

PART II - Understanding AI Governance: What Policies Affect Artificial Intelligence?

3 Chapter - Artificial Intelligence and Digital Trade: The Role of Policies Affecting Data, Algorithms and Computing Power

3.1 Introduction

The Fourth Industrial Revolution has greatly contributed to the germination and development of digital trade, a phenomenon that in the last two decades attracted the attention of numerous legal scholars that were interested in investigating the impact of technological progress on global trade governance and on the potential need for a revision and update of the multilateral trade rulebook.[276] Notably, most of these studies opted to conflate together the different digital technologies underpinning this Revolution and focused primarily on cross-border data, a decision partly driven by the idea that the rules and regulations governing digital trade would apply irrespective of the specific technology used to supply digital products or deliver goods and services digitally, and that data and their free flow across borders are relevant to all technologies employed in the digital economy and lie at the heart of digital trade.[277] As a matter of fact, ensuring access to (quality) data can be crucial for furthering the

[276] Mira Burri and Thomas Cottier (eds), *Trade Governance in the Digital Age: World Trade Forum* (Cambridge University Press 2012); Rolf H Weber, 'Digital Trade in WTO-Law - Taking Stock and Looking Ahead' (2010) 5 Asian Journal of WTO & International Health Law and Policy 1; Merit E Janov and Petros C Mavroidis, 'Digital Trade, E-Commerce, the WTO and Regional Frameworks' (2019) 18 World Trade Review s1; Mira Burri, 'The International Economic Law Framework for Digital Trade' (2015) 135 Zeitschrift für Schweizerisches Recht 10; Henry Gao, 'Regulation of Digital Trade in US Free Trade Agreements: From Trade Regulation to Digital Regulation' (2018) 45 Legal Issues of Economic Integration 47; RS Neeraj, 'Trade Rules for the Digital Economy: Charting New Waters at the WTO' (2019) 18 World Trade Review S121; He Bo, 'The Development and Outlook of International Digital Trade Rules within the WTO Framework WTO' (2020) 10 Journal of WTO and China 38; Aaronson and Leblond (n 24); Sen (n 191); Lee Tuthill, 'Cross-Border Data Flows: What Role for Trade Rules?' in Pierre Sauvé and Martin Roy (eds), *Research Handbook on Trade in Services* (Edward Elgar Publishing 2016); Andrew D Mitchell and Neha Mishra, 'Regulating Cross-Border Data Flows in a Data-Driven World: How WTO Law Can Contribute' (2019) 22 Journal of International Economic Law 389; Andrew D Mitchell and Neha Mishra, 'Data at the Docks: Modernizing International Trade Law for the Digital Economy' (2017) 20 Vanderbilt Journal of Entertainment & Technology Law 1073; Meltzer (n 23).

[277] Fleuter (n 25) 167; Meltzer (n 23) s39; Winston J Maxwell and Marc Bourreau, 'Technological Neutrality in Internet, Telecoms and Data Protection Regulation' (2014) 31 Computer and Telecommunications Law Review 1.

widespread use and commercialization, within and across borders, of Al applications. Likewise, the IoT can properly function only if data can move freely within its (borderless) network of interrelated sensor-based systems (i.e. devices, vehicles, buildings and other items embedded with electronics, software, sensors and network connectivity).[278] The functioning of blockchain, a decentralized, distributed database of transactions in which the latter are stored in a permanent and near inalterable way using cryptographic techniques, also depends on data being able to move freely across jurisdictions.[279] Therefore, most scholars and commentators found it useful to focus on "the" key element of digital trade (data flows) rather than on any specific technology.

However, as emerged from the discussion in Chapter 2, data are only one of the key components that enabled the most recent AI spring. Other policies may still be relevant for AI from an international trade law perspective. Indeed, as Ding points out in its study of China's AI strategy, data are one of factors driving a country's approach to AI development, but not necessarily the most important one, as other key features like hardware (i.e. microchips and supercomputing facilities), research and development, and the commercial ecosystem are also relevant for guaranteeing the proper functioning of artificial intelligence.[280] Indeed, a closer look at China's Next Generation of Artificial Intelligence Development Plan shows that the government called for the implementation of a variety of measures in order to pursue its goals, including the development of laws, regulations and ethical norms to ensure the healthy development of AI, the improvement of key policies that support AI development (e.g. tax incentives for AI-focused start-ups, high-tech enterprises tax incentives and R&D additional deductions, implementation of open data and protection-related policies), the establishment of standards and IP systems for AI technology, and the establishment of safety supervision and evaluation systems for AI (e.g. implementing design

[278] Natalia Miloslavskaya and Alexander Tolstoy, 'Internet of Things: Information Security Challenges and Solutions' (2019) 22 Cluster Computing 103, 104.
[279] Emmanuelle Ganne, 'Can Blockchain Revolutionize International Trade?' (World Trade Organization 2018) vii; Rachel F Fefer, 'Blockchain and International Trade' (Congressional Research Service 2019) IF10810 2.
[280] Jeffrey Ding, 'Dechipering China's AI Dream' (Future of Humanity Institute, University of Oxford 2018) 23.

accountability, evaluating AI influence on national security, adopting disciplinary measures against the abuse of data, violations of personal privacy and 'anything morally unethical').[281] Similarly, Goldfarb and Trefler observed that the size of domestic AI firms and trade in AI-powered products may be affected by policies other than domestic privacy policies and data localisation rules, such as the regulation of AI application industries, source code-related measures, and policies related to intellectual property, antitrust, and R&D subsidies.[282] Fink also argues that multiple jurisdictions have adopted measures related to the three core AI components (i.e. data, algorithms and computing power) that can act as non-tariff barriers to digital trade.[283]

Therefore, drawing heavily from existing literature on digital trade, this chapter investigates the nature, characteristics and purpose of policies that, albeit not designed to target AI alone or specifically, may still impact its use. By discussing how AI-related policies may affect AI-powered services, it aims to provide a preliminary understanding of the relationship between early forms of AI governance and international trade.

In order to do so, the chapter offers a description of three different types of AI-related policies. First, it discusses domestic data policies affecting the flow of data across borders, the rationale driving governmental action towards the adoption of restrictive data measures, and the impact these rules and regulations may have on AI-powered services and their trade across borders (Section 3.2). The analysis focuses on both *de jure* and *de facto* restrictions to cross-border data flows, namely data localisation requirements and disciplines on data protection. Then, the chapter proceeds with a description of measures related to the forced transfer of or access to source code and their impact on trade in AI-services sectors (Section 3.3), followed by a discussion of the relevance of micro-processors export control measures for the development and use of artificial intelligence (Section 3.4). Concluding remarks follow in Section 3.5.

[281] State Council of the People's Republic of China, 'China's New Generation of Artificial Intelligence Development Plan - English Translation' (*The Foundation for Law and International Affairs*, 30 July 2017) 25–27.
[282] Goldfarb and Trefler (n 38).
[283] Fink (n 75) 4.

3.2 Regulations on cross-border data flows

Since the inception of the WTO in the mid-1990s international trade has undergone a massive revolution. Driven by the widespread use of the Internet, the digitization of information and communication technologies and the wide application of digital technologies across all industrial sectors global trade has entered a new stage of development. [284] In this digital era, goods and services are increasingly being purchased online and delivered offline, new services are traded digitally across borders, manufacturing is undergoing a process of 'servicification' [285], and geographical distances shrink, enabling small businesses and developing-country firms to participate more actively in the global economy.[286]

At the core of digital trade and the digital economy lie data. Described as the essential capital of the data-driven economy[287], the basic unit enabling the functioning of the digital economy[288], and the lifeblood of international trade[289], data are a key tool in the production of a wide variety of digital goods and services, a tradeable asset, a conduit for delivering services and a key component for automation in trade facilitation.[290] Digital trade and the emerging technologies underpinning it are heavily dependent on the processing, storing, and use of data as well as their ability to move

[284] This digital era was preceded by 'traditional trade', characterized by the separation of production and consumption across international borders and trade in final goods, and 'GVC trade', represented by the fragmentation of production across national borders and the flourishing of trade in intermediate goods and services. Javier López González and Marie-Agnes Jouanjean, 'Digital Trade: Developing a Framework for Analysis' (OECD Publishing 2017) 10; Xiudian Dai, *The Digital Revolution and Governance* (Routledge Taylor and Francis Group 2018) 2.

[285] Servicification of manufacturing concerns "the increasing use, production, and sale of services in manufacturing" (Magnus Lodefalk, 'Servicification of Firms and Trade Policy Implications' (2017) 16 World Trade Review 59.) or the "increased reliance of manufacturing on services, whether as inputs, as activities within firms or as output sold bundled with goods" (Miroudot and Cadestin (n 54) 8.).

[286] Digital trade involves both digitally enabled purchases of digital services, and digitally enabled but physically delivered goods and services. Digitally enabled transactions include foreign goods or services purchased via a foreign on-line intermediary; foreign goods or services purchased via a domestic on-line intermediary; domestic goods or services purchased by a foreign on-line intermediary; and domestic goods or services purchased by a foreign-owned domestic intermediary. González and Jouanjean (n 284) 12–13; Meltzer (n 23) S24.

[287] Dan Ciuriak, 'Digital Trade: Is Data Treaty-Ready?' (Centre for International Governance Innovation 2018) CIGI Papers N. 162 1.

[288] Sen (n 191) 323.

[289] OECD, 'Trade and Cross-Border Data Flows' (Organization for Economic Cooperation and Development 2018) Working Party of the Trade Committee, TAD/TC/WP(2018)19/FINAL 8.

[290] Meltzer (n 23) S29; OECD, 'Trade and Cross-Border Data Flows' (n 289) 8.

freely across borders.[291] In particular, as clarified in the Chapter 2, artificial intelligence requires access to large data sets for its development and commercial deployment, as big data[292] are used to train AI algorithms and design AI predictive and analytical models.[293] These large datasets result from the global collection of discrete local data sets, a process that requires the unfettered flow of data across borders.[294]

The last decade has experienced a significant increase in rules and regulations restricting the cross-border flow of data, driven in part by policy considerations on privacy, security, surveillance, and law enforcement, sparking concerns about their impact on the opportunities offered by digitization and emerging technologies for international trade and economic growth.[295] Since the competitive advantage of AI-powered services and services suppliers depends on their ability to having privileged access to data[296], efforts to regulate cross-border flows of data are likely to impact artificial intelligence, as well as the production of and trade in services that rely on this technology.

Regulations on cross-border data flows are considered barriers to digital trade, and as such could potentially affect trade in AI-powered services. In constructing its Digital Trade Restrictiveness Index (DTRI), the European Centre for International Political Economy (ECIPE) identified restrictions on data (including restrictions on cross-border data flows) among the four broad categories of policy measures adopted by 64 developed and developing countries that can affect digital trade.[297] Likewise, the US International Trade Commission reported that US digitally-intensive firms consider

[291] OECD, 'Trade and Cross-Border Data Flows' (n 289) 6; Aaronson and Leblond (n 24) 245, 248.
[292] Big data refers to the "information asset characterised by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value". Andrea De Mauro, Marco Greco and Michele Grimaldi, 'A Formal Definition of Big Data Based on Its Essential Features' (2016) 65 Library Review 122, 131.
[293] Though data have been a staple of electronic commerce since the 1980s, they have become especially instrumental in driving the latest surge in commercialization of AI applications. Ciuriak (n 287) 1.
[294] Meltzer (n 23) S30.
[295] González and Jouanjean (n 284) 11; Meltzer (n 23) S23; Ferracane, Lee-Makiyama and van der Marel (n 42); Anupam Chander and Uyen P Le, 'Data Nationalism' (2015) 64 Emory Law Journal 677, 679.
[296] Ciuriak (n 287) 1.
[297] The other three categories comprise fiscal restrictions, establishment restrictions, and trading restrictions. Ferracane, Lee-Makiyama and van der Marel (n 42) 4.

government measures that regulate the movement of data across borders barriers to digital trade.[298]

Evidence suggests that limitations to cross-border data flows can be implemented either through *de jure* restrictions, in the form of local data localisation requirements, or through *de facto* restrictions, in the form of privacy and data protection laws.[299] Defined as any measure 'that specifically encumber(s) the transfer of data across national borders'[300], data localisation refers to any obligation, prohibition, condition, limit or other requirement provided for in laws, regulations or administrative provisions that imposes the location of data storage or other processing requirements within national borders or hinders storage or other processing of data outside the national territory.[301] Thus, data localisation requirements impose geographical limitations on data by restricting the processing, transferring, and storing data within the territorial boundaries of its state of origin.[302] On the other hand, privacy and data protection regulations can be considered as *de facto* data localisation measures.[303] By restricting the collection and use of personal data within national territories and imposing impracticable regulatory requirements or unreasonable compliance costs, restrictions on grounds of privacy or data protection could indirectly force localisation, thus limiting the ability of this type of data to move across borders.[304]

[298] Other obstacles to international digital trade identified by US digitally intensive firms are localization requirements, market access limits, intellectual property rights infringement, uncertain legal liability rules, and customs measures in other countries. United States International Trade Commission, 'Digital Trade in the U.S. and Global Economies, Part 2' (USITC 2014) Publication 4485, Investigation 332-540.
[299] Sen (n 191) 325–326; OECD, 'Trade and Cross-Border Data Flows' (n 289) 17.
[300] Chander and Le (n 295) 680.
[301] Proposal for a Regulation of the European Parliament and of the Council on a framework for the free flow of non-personal data in the European Union (COM(2017)495) 2017 Art. 3(5).
[302] Fink (n 75) 4–5; Richard D Taylor, '"Data Localization": The Internet in the Balance' (2020) 44 Telecommunications Policy 102003, 102003; Linxin Dai, 'A Survey of Cross-Border Data Transfer Regulations Through the Lens of the International Trade Law Regime' (2020) 52 New York University Journal of International Law & Politics 955, 958.
[303] Goldfarb and Trefler (n 38) 482; Sen (n 191) 325.
[304] Neha Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (2020) 19 World Trade Review 341, 342.

3.2.1 *De jure* restrictions: data localisation requirements

Data localisation measures can take different forms. They include outright bans on the transfer of data outside national borders, local storage and processing requirements[305], requests to use local data centers[306], and data retention requirements for Internet Service Providers.[307] Local content rules (e.g. content blocking, content filtering and geo-blocking) and licensing obligations for cloud services could also be considered data localisation measures with the potential to affect trade in AI-powered services.[308] The former can reduce the availability of data to train AI while the latter can affect cloud computing[309], a technology that AI can rely on to store and access data, by hampering the free flow of data across various data centers located in different jurisdictions.[310]

Evidence shows that data localisation measures are imposed primarily – though not exclusively – by developing countries.[311] China, Russa and Vietnam offer examples of data storage and processing requirements. Adopted in 2017, China's Cybersecurity Law establishes that "critical information infrastructure operators that gather or produce personal information or important data during operations within the mainland territory of the People's Republic of China, shall store it within mainland China".[312] Likewise, Vietnam's Law on Cybersecurity, adopted in 2018, mandates domestic and

[305] Local storage requirements refer to measures imposing certain types of data or their copy to be stored in local servers. Measures imposing the processing of data in local services fall under the category of local processing requirements. OECD, 'Trade and Cross-Border Data Flows' (n 289) 24.
[306] Requests to use local data centers prevent the usage of cloud computing services where servers are located outside the relevant jurisdiction. Fink (n 75) 4–5.
[307] Martina Ferracane, 'Restrictions to Cross-Border Data Flows: A Taxonomy' (ECIPE 2017) <https://ecipe.org/publications/restrictions-to-cross-border-data-flows-a-taxonomy/> accessed 7 December 2020; Meltzer (n 23); Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55.
[308] Fink (n 75) 4–5.
[309] Cloud computing is a way of using computers in which data and software are stored or managed on a network of servers, to which users have access over the internet. Many new companies now prefer to use cloud computing services rather than invest in hardware (e.g. in-house servers) or software.Oxford Advanced Learner's Dictionary, 'Cloud Computing' <https://www.oxfordlearnersdictionaries.com/definition/english/cloud-computing> accessed 11 November 2021.
[310] Fink (n 75) 4–5.
[311] Dai (n 302) 959; Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55; Meltzer (n 23).
[312] Cybersecurity Law of the People's Republic of China, effective June 1, 2017 Article 37. Official text in Chinese. English translation available at: Rogier Creemers, Paul Triolo and Graham Webster, 'Translation: Cybersecurity Law of the People's Republic of China (Effective June 1, 2017)' (*New America*, 28 June 2018) <http://newamerica.org/cybersecurity-initiative/digichina/blog/translation-cybersecurity-law-peoples-republic-china/> accessed 29 January 2021.

foreign enterprises that "provide services on the telecom network, the internet and value-added services on cyberspace in Vietnam" and are "involved in the collection, exploitation, analysis, [and/or] processing of personal information, data about users' relationship [and/or] data generated by users in Vietnam" to store data within the territory of Vietnam for a period of time established by the draft decree guiding its implementation.[313] In 2014 Russia amended its Federal Law on Personal Data[314] to include in Article 18.5 a requirement for operators collecting data through the Internet to "ensure that databases located within the Russian Federation are used to record, systematize, accumulate, store, clarify (update or modify) and retrieve personal data of citizens of the Russian Federation", barring a few exceptions.[315] This amendment entered into force on 1 September 2015.[316]

China and Russia, together with Turkey, also offer examples of data restrictions in the form of content requirements and data retention obligations. Through its 'Great Firewall', China has established one of the most sophisticated and extensive Internet filtering systems in the world, tasked with blocking or filtering websites originating from overseas.[317] Similarly, by amending its Law No. 5651 on Regulating the Internet Turkey has enabled its telecommunications regulator to block access to content without a prior court order, thus sowing the seeds for the establishment of a

[313] Law No. 24/2018/QH14 on Cybersecurity, (2018), in force since 01.01.2019. Official text in Vietnamese. English translation of Art. 26.3 is available at: Chung Seck Yee and Thanh Son Dang, 'Vietnam National Assembly Passes the Law on Cybersecurity' (*Baker McKenzie, Global Compliance News*, 2 July 2018) <https://globalcompliancenews.com/vietnam-law-cybersecurity-20180702/> accessed 29 January 2021.
[314] Federal Law N 152-FZ on Personal Data, 27 July 2006.
[315] Federal Law No. 242-FZ on Amending Some Legislative Acts of the Russian Federation in as Much as It Concerns Updating the Procedure for Personal Data Processing in Information-Telecommunication Networks (with Amendments and Additions), 21 July 2014. Original text in Russian. English version available at: The Federal Service for Supervision of Communications, Information Technology and Mass Media, 'Personal Data Portal of the Competent Authority for Protecting the Rights of Personal Data Subjects in the Russian Federation' (2021) <http://eng.pd.rkn.gov.ru/> accessed 29 January 2021.
[316] Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55.
[317] Under this system, data pass through Chinese government-controlled international Internet routers, that either lose politically sensitive or controversial information, or redirect users to 'safer' or 'politically neutral' websites. Cynthia Liu, 'Internet Censorship as a Trade Barrier: A Look at the WTO Consistency of the Great Firewall in the Wake of the China-Google Dispute.' (2011) 42 Georgetown Journal of International Law 1199, 1207–1208.

censorship-prone regime.[318] Russia, on the other hand, imposes strict data retention requirements for a minimum of 12 hours on Internet Service Providers (ISPs) and companies defined as "organizers of information distribution in the internet", providing the Russian Federal Security Service (FSB) with direct access to a wider range of data without a court order.[319]

Though most data localisation measures apply horizontally, in some cases countries have limited their scope of application to specific groups of operators or type of contracts. For instance, India requires that payment service providers set up data centers or store their data with cloud providers using Indian data centers.[320] Likewise, Turkey requires internet payment service providers like PayPal to store data within the country for at least ten years[321], a rule that Ferracane, Lee-Makiyama and van der Marel suggest should be considered a data retention requirement.[322] Brazil imposes local data storage requirements for public procurement contracts including in cloud computing services.[323]

Likewise, data localisation requirements may be limited to certain sectors, especially those handling sensitive data such as finance and healthcare.[324] Case in point is Australia, whose Personally Controlled Electronic Records Act of 2012 places a ban on holding or transferring health data outside the territory of the country.[325] Other countries that opted for these sector-specific measures are Russia[326], New Zealand[327], and Turkey[328]. Evidence suggests that China progressed from a fragmented legal

[318] Justifiable reasons for banning content include protection of life and private property, protection of national security and public order, prevention of crimes, and protection of public health. Ferracane, Lee-Makiyama and van der Marel (n 42) 54; 'Turkey: Law on Internet Publications Amended' (*Library of Congress, Washington, D.C. 20540 USA*, 24 February 2014) <https://www.loc.gov/item/global-legal-monitor/2014-02-24/turkey-law-on-internet-publications-amended/> accessed 11 November 2021.
[319] Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55.
[320] Fink (n 75) 4–5; 'Reserve Bank of India Notification, "Storage of Payment Systems Data", RBI/2017-18/153' 4–5.
[321] Meltzer (n 23) s36.
[322] Ferracane, Lee-Makiyama and van der Marel (n 42) 54.F
[323] Fink (n 75) 5.
[324] Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55; Dai (n 302) 960.
[325] Personally Controlled Electronic Health Records Act 2012, N. 63 Article 77.
[326] Ferracane, Lee-Makiyama and van der Marel (n 42) 54.
[327] Goods and Services Tax Act 1985, s 75(3BA).
[328] Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions, No. 6483, art. 23(1) (as amended by Law No. 6637 of Mar. 27, 2015) (June 20, 2013).

framework based on sectoral data localisation requirements for finance, healthcare, and electronic media to a uniform cybersecurity legal regime requiring data localisation for all general personal data.[329]

3.2.2 *De facto* restrictions: data protection laws

De facto restrictions to cross-border data flows, in the form of privacy and data protection laws, also abound. To date the General Data Protection Regulation (GDPR)[330], which the EU views as the global standard for personal data protection, constitutes the most notable example.[331] In force since May 2018, the GDPR aims to regulate the processing[332] and free flow of personal data of individuals in the EU, based on the principle that personal data protection is a fundamental right in accordance with Article 8(1) of the Charter of Fundamental Rights of the European Union and Article 16(1) of the Treaty on the Functioning of the European Union (TFEU).[333] Other countries, mainly Latin American (e.g. Chile, Colombia, Ecuador, and Mexico), are also attempting to make personal data protection a constitutional right, albeit with some differences as to the efficacy of enforcement.[334]

Targeting a variety of personal data[335], the new EU Regulation sets out the rights of 'data subjects', including the right to access, right to erasure (also known as the 'right

[329] Dai (n 302) 959; Ferracane, Lee-Makiyama and van der Marel (n 42) 55.
[330] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance) 2016 (OJ 2016, L119).
[331] Mark Scott and Laurens Cerulus, 'Europe's New Data Protection Rules Export Privacy Standards Worldwide' (*POLITICO*, 31 January 2018) <https://www.politico.eu/article/europe-data-protection-privacy-standards-gdpr-general-protection-data-regulation/> accessed 1 February 2021.
[332] The GDPR defines 'processing' as "any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction". GDPR, Article 4(2).
[333] GDPR, § (1).
[334] Susan Ariel Aaronson, 'Data Is Different: Why the World Needs a New Approach to Governing Cross-Border Data Flows' (Center for International Governance Innovation 2018) CIGI Papers N. 197 7.
[335] Under the GDPR, 'personal data' means "any information relating to an identified or identifiable natural person ('data subject')" such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural, or social identity of that natural person. GDPR, Article 4(1).

to be forgotten'), and right to information, as well as the obligations of those who process and determine the processing of personal data.[336] Notably, the GDPR has extraterritorial application. Besides applying to the data processed by controllers of processors established in the EU, regardless of whether the processing takes place within or outside the EU, the GDPR also applies to the processing of personal data of data subjects who are in the EU by a controller or processor established outside the EU, where the processing activities related to the offering of goods or services to such data subjects in the EU.[337]

From an AI perspective the adoption of the GDPR is significant for three main reasons. First, it affords protection of personal data irrespective of the technology used to process them, including by automated means.[338] Secondly, it contains provisions that are specific to the functioning of AI systems. Case in point is Article 22, which prescribes that data subjects have "the right not to be subject to a decision based solely on automated processing, including profiling" which produces legal effects concerning them or significantly affects them, unless, for example, the data subject has given their explicit consent.[339] Furthermore, Articles 13.2 and 14.2 state that in order to ensure fair and transparent processing the controller must provide the data subject with information regarding the existence of automated decision-making, including profiling and meaningful information about the logic involved, as well as the significance and the envisaged consequences of such processing for the data subject.[340] Thirdly, its rules on the transfer of data to third countries may impact the development of AI and, especially, trade in AI-powered services. Article 45 GDPR authorises data transfers only to third countries that ensure an 'adequate level of protection', which the European Commission is in charge of assessing.[341] Article 46 GDPR clarifies that, in the absence of an adequacy decision, transfers of data to third countries may occur as long as the controller or processor has provided adequate

[336] GDPR, § (11).
[337] GDPR, Article 3.
[338] GDPR, § (13).
[339] GDPR, Article 22.
[340] GDPR.
[341] GDPR, Article 45 (1).

safeguards.[342] By conditioning the flow of data across borders on the fulfilment of adequacy requirements[343], the EU impacts the ability of foreign suppliers to rely on the processing of personal data of EU data subjects to train their AI algorithms and supply their AI-powered services, resulting in potential discrimination in favour of domestic AI-powered services and services suppliers whenever the adequacy requirements are not met.

Besides the EU, other countries have introduced data protection laws, providing requirements regulating cross-border data transfers similar to those established by the GDPR, albeit with some marked differences.[344] For example, Russia, Australia, and Singapore opted for conditional data flows regimes that bear some resemblance to the standard of protection afforded by the EU framework, though they were adopted before the entry into force of the GDPR. Russia's Federal Law on Personal Data establishes that, before transferring data across borders, operators must ensure that the receiving country provides an adequate level of data protection. [345] This requirement is not necessary if the individual concerned gives their consent to the cross-border transfer of their personal data.[346] Parties to the Convention of the Council of Europe for the Protection of Individuals with regard to Automatic Processing of Personal Data[347] and non-parties whose norms of law and applicable personal data security measures comply with the provisions of said Convention are considered to provide for adequate personal data protection.[348]

The Australia Privacy Act, first adopted in 1988 and latest amended in 2019, aims to facilitate the free flow of information across national borders while ensuring respect

[342] GDPR, Article 45 (1).
[343] Adequacy requirements refer to the obligation imposed on recipients of the data outside the sending country to have adequate data protection measures in place. Dai (n 302) 961.
[344] ibid 961–962.
[345] Federal Law N 152-FZ on Personal Data, 27 July 2006. Chapter 2, Section 12. Official text in Russian. English translation available at: 'Federal Law n. 152-FZ of July 27, 2006 on Personal Data' (*WKO - Austrian Economic Chambers*, 2015) <https://wko.at/ooe/Branchen/Industrie/Zusendungen/FEDERAL_LAW.pdf> accessed 2 February 2021.
[346] Federal Law N 152-FZ on Personal Data, 27 July 2006. Chapter 2, Article 12(3) and (4).
[347] Parties to the Convention include Albania, EU Members, Russian Federation, Switzerland, Turkey, Ukraine and the UK Council of Europe, Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data, 28 January 1981.
[348] Federal Law N 152-FZ on Personal Data, 27 July 2006. Chapter 2, Article 12(1).

for the privacy of individuals.[349] Applicable to acts done in Australia as well as outside its territory by an organization, or small business operator, with an 'Australian link'[350], the Privacy Act requires entities to take reasonable steps to ensure that the overseas recipient does not breach its Australian Privacy Principles before data can be transferred across borders.[351] This requirement for 'reasonable steps' is not necessary for cases where he entity reasonably believes that the overseas recipient is subject to a law, or binding scheme, that protects data in substantially similar way to the Australian Privacy Principles (APP), and the individual can take action to enforce data protection, or if the individual has given its prior consent.[352] The Privacy Act provides no further indication regarding how to assess the substantial similarity between the personal data protection afforded by the law or binding scheme at issue and the APP.

In order to transfer personal data outside the national territory, Singapore's Personal Data Protection Act (PDPA) of 2012 requires that the receiving organization has in place "comparable protection" to the standards set out in said Act, though exemptions may be granted by the Personal Data Protection Commission responsible for the administration of PDPA.[353] According to the Personal Data Protection Regulations 2021, instruments that would ensure a comparable standard of protection are legally enforceable obligations (e.g. laws, contracts, binding corporate rules), 'specified certifications' (i.e. certifications under APEC CBPR[354] and APEC PRP[355] systems), and the consent[356] of the individual.

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[349] Australian Government (2019), Privacy Act 1988 - Compilation N. 82 Part I, 2A.
[350] An organisation or small business operator has an 'Australian link' if they are: (a) an Australian citizen; or (b) a person whose continued presence in Australia is not subject to a limitation as to time imposed by law; or (c) a partnership formed in Australia or an external Territory; or (d) a trust created in Australia or an external Territory; or (e) a body corporate incorporated in Australia or an external Territory; or (f) an unincorporated association that has its central management and control in Australia or an external Territory. If the organization or small business operator does not satisfy any of these criteria, it will still fall under the scope of application of the Privacy Act 1988 if it carriers its business in Australia (or an external Territory) and personal information was collected or held by the organisation or operator in Australia or an external Territory either before or at the time of the act. ibid Part I, 5B.
[351] ibid Part III, APP 8.1.
[352] ibid Part III, APP 8.2.
[353] Personal Data Protection Act 2012, N. 26 of 2012 Section 26.
[354] Asia Pacific Economic Cooperation Cross-Border Privacy Rules.
[355] Asia Pacific Economic Cooperation Privacy Recognition for Processors.
[356] Besides cases of explicit consent, an individual is deemed to have consented to the disclosure by the transferring organisation of the individual's personal data where the transfer is reasonably necessary

Other countries opted for less restrictive regimes or limited the territorial or sectoral scope of application of their data protection requirements. For example, according to DLA Piper database on data protection laws across the globe, Thailand's regime established though the 2019 Personal Data Protection Act, although heavily influenced by the GDPR, is less restrictive. [357] The United States have several sector-specific and medium-specific national privacy or data security laws, covering financial institutions, telecommunications companies, personal health information, credit report information, children's information, telemarketing and direct marketing.[358] In Canada there are 28 federal, provincial and territorial privacy statutes that govern the protection of personal information both in the private and the public sectors. Some have limited sectoral coverage (e.g., health sectors). This is similar to the data protection framework established by Australia where, in addition to a national law, there are several other territorial and sectoral regulations that make up the country's overall data protection governance framework.[359]

Some governments have recently introduced requirements to acquire consent for the collection of data, which can be especially burdensome for AI services suppliers. For example, Turkey's Data Protection Law, stipulates that personal data cannot be processed or transferred abroad without the data subject's explicit consent, subject to certain exceptions.[360] Similarly, Articles 22, 41 and 42 of the Chinese Cybersecurity Law contain consent requirements for network operators collecting and using personal information, including a ban on the transfer of personal information to third parties

for the conclusion or performance of a contract between the organisation and the individual, including the transfer to a third party organization. Personal Data Protection Commission Singapore, Advisory Guidelines on Key Concepts in the Personal Data Protection Act, dated 1 February 2021.

[357] Global law firm DLA Piper has created a comprehensive database on data protection laws around the world, enabling comparisons among national regulations and offering preliminary assessments on the scope and depth of their obligations. DLA Piper, 'Data Protection Laws of the World' (*DLA Piper*, 2021) <https://www.dlapiperdataprotection.com/index.html?t=world-map&c=AU&c2=IT> accessed 2 February 2021.

[358] ibid.

[359] ibid.

[360] Law No. 6698 on the Protection of Personal Data, dated 7 April 2016 Article 5.1 and 5.2. Official text in Turkish. English translation available at: 'Turkish Data Protection Law No. 6698 - English Translation' (*Kişisel Verilerin Korunması Kanunu (KVKK) 6698 sayılı KVKK*, 2016) <https://kvkk.pro/turkish-data-protection-law.html> accessed 29 January 2021.

without the person's prior consent.[361] Likewise, Brazil restricts the disclosure of personal data outside its territory unless prior consent is obtained, or another exception applies.[362]

Besides national data protection laws, there exist a few international data protection instruments that address the issue of data transfers, largely in the context of personal data: the Privacy Guidelines of the Organization for Economic Cooperation and Development (OECD), the Convention 108 of the Council of Europe, or the APEC CBPR System. The former aims to ensure the protection of privacy in the face of new challenges posed by technologies and to avoid unjustified restrictions on data flows and the economic and social benefits they enable.[363] The Convention 108 is a treaty protecting the right to privacy of individuals with respect to personal data that are automatically processed.[364] The CBPR System is a non-mandatory framework developed by APEC economies to promote the interoperability of privacy regulation through the enforcement of minimum standards.[365]

According to the OECD, there are three main approaches to cross-borders data flows: (i) restrictions subject to case-by-case, or ad hoc, authorization; (ii) lack of regulation; and (iii) ex-post accountability, whereby cross-border transfer of data is made conditional to various types of safeguards, including adequacy determinations, (pre-)approved contractual safeguards, binding corporate rules (BCR) and standard exceptions (e.g. public interest, fulfilment of contractual need, prior consent).[366]

From an AI perspective, the first two can be rather significant. Indeed, when countries adopt restrictions to cross-border data flows subject to case-by-case, or ad hoc, authorization, uncertainty for suppliers of AI-powered services ensues, since access to

[361] Cybersecurity Law of the People's Republic of China, effective June 1, 2017 Article 37. Official text in Chinese. English translation available at: Creemers, Triolo and Webster (n 312).
[362] Elizabeth Harding, Lisa J Acevedo and Lindsay R Dailey, 'Data Localization and Data Transfer Restrictions' (2021) XI The National Law Review <https://www.natlawreview.com/article/data-localization-and-data-transfer-restrictions> accessed 29 December 2021.
[363] OECD, 'Trade and Cross-Border Data Flows' (n 289) 26.
[364] ibid.
[365] To date, only six of the twenty-one APEC economies are participating to the CBPR System. Even when an economy adheres to it, businesses can decide whether to seek certification under the System. ibid.
[366] ibid 5, 17, 20–21.

data is subject to the discretionary approval be relevant authorities.[367] On the other hand, the absence of data protection laws and other restrictions on the movement of data across borders may induce foreign suppliers of AI-powered services based in jurisdictions with more stringent data-related rules to import the data necessary to train their AI algorithms from the countries that take this approach, mainly least developed and developing countries, rather than comply with the more costly and burdensome domestic data-related requirements. Therefore, this would lead to 'diversion' in data collection and processing and to the transformation of countries with no privacy or data protection mechanisms in place into 'data exporters', raising concerns about their ability to benefit from the economic and societal opportunities accruing from artificial intelligence.[368] It would also mean that the latter may find it difficult to evolve from suppliers of data to suppliers of AI-powered services. Given that the accuracy and efficiency of AI algorithms is directly correlated to the quantity (and quality) of training data, having access to larger pools of data gives a competitive advantage in AI development. Service suppliers in countries with more stringent data-related measures could collect data both domestically and in countries with no restrictions on cross-border data flows. However, since the lack of restrictions on the movement of data can predicate the willingness of other countries to grant access to and use of their datasets outside their national territory[369], suppliers located in countries with no regulations on data protection are likely to only have access to domestic data, thus preventing them from being as competitive as their counterparts established in jurisdictions with extensive norms on cross-border data flows.

3.2.3 Rationale behind adoption of restrictions on cross-border data flows

Different reasons may induce governments to introduce restrictions on cross-border data flows. Numerous studies indicate that protecting privacy and minimizing the risk of abuse and misuse of personally identifiable data, defending national security against foreign surveillance, guaranteeing security in the cyberspace (e.g., against cybercrime

[367] ibid.
[368] Fink (n 75) 12.
[369] OECD, 'Trade and Cross-Border Data Flows' (n 289) 5, 17, 20–21.

and attacks to network stability), protecting consumers rights, enforcing compliance with domestic laws, and promoting economic development are among the most recurring motivations.[370]

Concerns about the potential abuse and misuse of personal data moving across different jurisdictions where cultural approaches to privacy can vary greatly and difference in regulations may undermine domestic privacy standards may lead governments to introduce data protection laws.[371] Case in point is the EU, who justified its decision to adopt a stringent data protection regime on the basis that the protection of personal data is a fundamental right pursuant to Article 8(1) of the Charter of Fundamental Rights of the European Union and Article 16(1) of the TFEU.[372]

National security concerns may also drive decisions to impose restrictions on data flows.[373] For instance, China's approach to data regulation puts security first, as stated in Article 1 of its 2017 Cybersecurity Law, whose primary objective is to safeguard cyberspace sovereignty and national security.[374] Goldfarb and Trefler point out that arguments in favour of forcing data to remain within the national territory rest on the idea that this would ensure that governments can protect their citizens' data through the laws of the domestic country, since foreign national security agencies would be prevented from accessing data created and processed within the country and foreign companies would be bound by the laws of the country where the data are collected.[375]

Other studies suggest that governments may implement data localisation measures to fend off cybersecurity threats to the global ICT infrastructure, whose stability and reliability are critical to ensure consumer trust in digital transactions.[376] For example,

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[370] Chander and Le (n 295) 713; Meltzer (n 23); Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304) 346; Mitchell and Mishra, 'Regulating Cross-Border Data Flows in a Data-Driven World: How WTO Law Can Contribute' (n 276) 392–397; OECD, 'Trade and Cross-Border Data Flows' (n 289) 5.
[371] OECD, 'Trade and Cross-Border Data Flows' (n 289) 14; Meltzer (n 23).
[372] GDPR § (1).
[373] Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55.
[374] Cybersecurity Law of the People's Republic of China, effective June 1, 2017 Article 37. Official text in Chinese. English translation available at: Creemers, Triolo and Webster (n 312).
[375] Goldfarb and Trefler (n 38) 485–486.
[376] Neha Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (2020) 54 Journal of World Trade 567, 567.

some governments have argued that data storage requirements allegedly reduce risks of cyber theft.[377]

Countries may also justify measures restricting data flows to meet other regulatory objectives, such as access to information for audit purposes, law enforcement, or criminal investigations, arguing that it is easier to enforce domestic laws and regulations when data reside in local services.[378] For instance, Ferracane, Lee-Makiyama and van der Marel suggest that Russian data retention rules were adopted as a tool for national anti-terrorist investigations.[379] This can be observed primarily in telecommunications and financial services, sectors that are heavily regulated in the offline world[380] and among the first to experience the application of AI for commercial purposes in the online world.

Arguing that data are a highly valuable resource for the development of the digital economy that should be made available first and foremost to national producers or suppliers, some countries are also increasingly using data regulation to develop domestic capacity in digitally intensive sectors, including AI-powered services.[381] However, in some cases the objective appears more akin to preventing foreign competitors from weakening the domestic industry rather than to fostering innovation. For example, it could be argued that the EU, which lacks a strong digital industry, has actually implemented stringent rules on data protection in order to defend its domestic industry from potential competition from foreign companies located in China and the US.

Governments may also adopt data localisation measures on the basis of moral or religious grounds.[382] For example, the official motivation behind Iran's decision to create an 'Halal' Internet was to develop a network free of Western influence, though

[377] Meltzer (n 23).
[378] OECD, 'Trade and Cross-Border Data Flows' (n 289) 5; Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304) 342.
[379] Ferracane (n 307).
[380] OECD, 'Trade and Cross-Border Data Flows' (n 289) 14.
[381] Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304) 342; OECD, 'Trade and Cross-Border Data Flows' (n 289) 5, 14.
[382] Meltzer (n 23).

the unofficial reason is more likely to be ascribed to a desire to thwart domestic dissent.[383] Likewise, some commentators have argued that, although officially adopted to protect public morals, Chinese restrictions on content access can be mainly ascribed to attempts to censor political dissent against the ruling Communist Party and maintain social stability.[384]

Albeit conveniently hidden behind legitimate public policy rationales, protectionist motivations may induce governments to implement data localisation measures.[385] Imposing data storage requirements or outright bans on the transfer of data across borders for the purpose of enhancing the local IT industry or supporting the growth of domestic internet champions would fall under this category.[386] China's Great Firewall offers the best example.[387] Explicitly justified by security concerns, China's restrictions to cross-border data flows are also implicitly driven by desire to nurture knowledge-based sectors, including those that rely on the use of AI technology.[388] However, it is debatable whether data localisation measures can achieve their intended purposes, and whether less trade restrictive policy measures are available for a country to achieve its non-economic policy objectives.[389]

3.2.4 Impact of barriers to cross-border flows of data on AI-powered services

Conclusions reached by scholars on the negative impact of data flows restrictions on digital trade[390] and on the development and functioning of AI technology[391] suggest that barriers to cross-border data flows could affect AI-powered services and their

[383] Chander and Le (n 295).
[384] Meltzer (n 23); Aaronson and Leblond (n 24) 247.
[385] Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304) 343.
[386] Meltzer (n 23).
[387] Blocking or degrading access to services provided by US multinationals like Google and Facebook allowed Chinese companies like Baidu and Sina Weibo to grow into economic juggernauts dominating the domestic market. ibid.
[388] Aaronson and Leblond (n 24) 247.
[389] Ferracane, Lee-Makiyama and van der Marel (n 42) 54–55; Chander and Le (n 295).
[390] Chander and Le (n 295); Dai (n 302); Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304).
[391] Fink (n 75); Goldfarb and Trefler (n 38).

trade across borders. First, since data localisation requirements and data protection laws impact one of the key components of AI, they may hinder the quality of the services that rely on this technology. AI functions on the basis that its algorithms can be trained using large quantities of data whose sources may be scattered across different jurisdictions. The greater the volume of training data available to AI developers, the higher the quality of analysis and predictions made by AI algorithms.[392] If suppliers of AI-powered services are prevented from accessing data originating in territories other than where they are located, the quality of aggregate predictions from their AI algorithms will be lower, thus compromising the quality of their services.[393] In turn, this could result in an erosion in competitive advantage for these services suppliers in favour of competitors that operate in jurisdictions with less stringent data policy frameworks.

Likewise, restrictions to cross-border data flows are likely to stifle AI innovation. As Goldfarb and Tucker point out, privacy regulations "directly affect the usage and efficacy of emerging technologies" and the direction of innovation.[394] Since AI depends on the availability of big data, restrictions that limit the access and use of data impact the ability to develop and use artificial intelligence given the available data, thus hindering the growth of this technology and its commercial applications, as illustrated by empirical evidence.[395] This runs counter to the argument that digital protectionism, in the form of data restrictions, could help create an enabling environment for technological innovation and nurture national champions in the AI field. China may be the exception, given that it can still rely on abundant (domestic) data despite its stringent rules on data.[396]

Data localisation requirements and data protection laws may also lead to significant increases in compliance and operational costs for foreign firms. Collecting and processing data originating from the jurisdictions that adopted such measures would

[392] The quality of data used to train AI algorithms is equally important.
[393] Goldfarb and Trefler (n 38) 485–486.
[394] Avi Goldfarb and Catherine Tucker, 'Privacy and Innovation' (2012) 12 Innovation Policy and the Economy 65, 85.
[395] Goldfarb and Trefler (n 38) 483.
[396] Lee (n 106) 12–14.

require foreign companies, including AI-powered service suppliers, to set up servers (or outsource storage services to companies) in all the implementing countries in order to carry out their business activities.[397] This could be especially detrimental to small and medium-sized enterprises (SMEs) that, in light of their limited capital, may be unable to set up such commercial presence abroad[398], resulting in a *de facto* market access barrier.

One could counter that there may be benefits in storing data or keeping copies of data in the serves located in the same jurisdiction where they are created. For instance, as indicated by IBM, processing and analysing data closer to the point where they are generated can help reduce bandwidth and latency issues, resulting in greater efficiency, faster response times and improved customer experiences.[399] However, adopting technologies like edge computing come at a cost that, for some companies, especially of smaller size and with limited financial resources, may outweigh the benefits, leaving them to opt for cheaper solutions, including those that would require the unfettered flow of data across different jurisdictions. Therefore, when domestic regulations impose data localisation requirements on firms that would otherwise not find it in their interest to localize the processing and analysing of data in the imposing jurisdiction where their consumers and end users are, they *de facto* act as barriers to digital trade, including to trade in AI-powered services.

Requirements to obtain consent from individuals or relevant authorities for the collection, use and transfer of personal data across borders, as well as adequacy requirements, may also significantly increase costs for firms, preventing interoperability across the global supply chain.[400] These measures, in conjunction with

[397] Dai (n 302) 959. Dai, L. (2020), 'A Survey of Cross-Border Data Transfer Regulations Through the Lens of the International Trade Law Regime', *New York University Journal of International Law & Politics*, 52, p. 959.
[398] Rudolf Adlung and Marta Soprana, 'SMEs in Services Trade – A GATS Perspective' (2013) 2013 Intereconomics 41.
[399] Edge computing, the technology that processes and analyses data closer to the point where it is created, is used, among others, for AI applications. IBM, 'What Is Edge Computing' (*IBM*, 6 November 2020) <https://www.ibm.com/cloud/what-is-edge-computing> accessed 11 November 2021.
[400] Mishra, 'Privacy, Cybersecurity, and GATS Article XIV: A New Frontier for Trade and Internet Regulation?' (n 304) 344; Dai (n 302) 961.

the heterogeneity of definitions of personal and non-personal data, across and within countries[401], may actually prevent some AI companies from carrying out business activities in the implementing jurisdictions. Due to the high volume and variety of data that this technology is able to process and the fact that AI algorithms can derive personal information from the processing of non-personal information, complying with prior consent rules may prove overly burdensome and costly.

3.3 Algorithm-related policies: forced disclosure of source code

In recent years a few governments have started to implement policies related to the functioning of algorithms that, although not necessarily explicitly designed to target solely artificial intelligence and its applications, could affect all digital services, including those powered by AI technology, and act as a restriction to trade. Indeed, a few countries have recently introduced legislation requiring access to, disclosure or transfer of source code as a pre-condition for granting access to their market. Although for some automated systems 'source code' may refer to "the statistical models that rank, sort, classify, and score inputs"[402], in layman's terms it refers to the translation of an algorithm into a computer programme, where an algorithm is a set of mathematical instructions or rules that must be followed to solve a problem or complete a computer process.[403] By writing these instructions in a computer using alphanumeric characters that only humans can read, but not machines, programmers translate algorithms into source code, passing on the instructions of the algorithm to the machine using computer programming languages.[404] Therefore, forcing the disclosure of source code is tantamount to requiring developers to reveal the instructions included in the algorithm that, together with the model, constitute the value added of any AI

[401] Dai (n 302) 956–959.
[402] Aaron Rieke, Miranda Bogen and David G Robinson, 'Public Scrutiny of Automated Decisions: Early Lessons and Emerging Methods' (Upturn 2018) 19 <https://apo.org.au/node/210086> accessed 5 November 2021.
[403] Merriam-Webster.com, 'Algorithm' (n 76).
[404] Merriam-Webster.com, 'Source Code' <https://www.merriam-webster.com/dictionary/source+code> accessed 13 April 2021; The Linux Information Project, 'Source Code Definition by The Linux Information Project' <http://www.linfo.org/source_code.html> accessed 13 April 2021; The American Heritage Dictionary of the English Language, 'Source Code' <https://www.ahdictionary.com/word/search.html?q=source+code> accessed 14 April 2021.

application and can – currently - be protected under intellectual property law only as trade secrets (or undisclosed information).[405]

Makiyama observed that China, Russia and India are among the countries that have started to introduce mandatory requirements to disclose, give access to, or transfer source code as a market access condition.[406] For example, China's 2017 Cybersecurity Law[407] requires companies to disclose proprietary formula or designs in order to gain approval from regulatory agencies, putting them in the difficult position of choosing between pursuing market opportunities in China or protecting their intellectual property from potential misappropriation.[408] In Russia, on the other hand, failure of companies to comply with explicitly demands for algorithms and source codes to be shared with the public authorities leads to their services being blocked in the country, in accordance with the 2016 Federal Law No. 374 on Amending the Federal Law on Counterterrorism and Select Legislative Acts of the Russian Federation Concerning the Creation of Additional Measures Aimed at Countering Terrorism and Protecting Public Safety.[409] In India, as well as Colombia and Indonesia, procurement laws allow the government to misappropriate commercial algorithms and source codes.[410]

Numerous reasons may prompt governments to require the transfer of, access to, or disclosure of source code. Governmental intervention may be driven by legitimate policy objectives, such as ensuring high-quality and safety of digital products and services, investigate anti-competitive behaviour and abuse of dominant position, ensuring tax compliance, regulating high frequency trading to avoid stock market destabilisation, minimizing vulnerabilities to hacking, and preventing discrimination of minority and vulnerable groups which, in the case of AI systems, may result from the

[405] Fink (n 75) 4–5.
[406] Lee-Makiyama (n 36) 6–7.
[407] Cybersecurity Law of the People's Republic of China, effective June 1, 2017.
[408] Office of the United States Trade Representative, 'Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974' (2018) 43.
[409] Lee-Makiyama (n 36) 6.
[410] ibid 7.

use of facial recognition technologies or biased algorithms underlying AI predictions.[411] Governments may also demand information about source code under antidiscrimination laws, to prevent discrimination of minority and vulnerable groups which, in the case of AI systems, may result from the use of facial recognition technologies or biased algorithms underlying AI predictions.[412] Public authorities may also require access to source code for transparency and accountability purposes, in response to the concerns arising from the use of 'black-box' AI algorithms.[413] As exemplified by Russia, which imposes the examination of business and anti-virus software on national security grounds, governments may justify demands for access to source code of all software, including AI, on the basis of national security concerns.[414]

However, behind the alleged pursuit of legitimate policy objective may lay protectionist purposes. For example, source code reviews can be used to reduce the ability of foreign firms to maintain trade secrets[415], allowing domestic firms to acquire valuable proprietary information that, if copied, can be used to foster national champions. Also, if applied in a discriminatory manner, these source code requirements could be used to discourage or prevent foreign firms from exporting their products and services in the territory of the country imposing these measures, to the potential advantage of domestic companies that may not be required to comply with these requirements to serve the domestic market. As a matter of fact, the requirement for digital technology providers to submit their algorithms and source code for government review may restrict trade to the extent that it affects vital commercial interests of companies that risk losing the exclusive right over their technologies.[416]

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[411] Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 18; Sanya Reid Smith, 'Some Preliminary Implications of WTO Source Code Proposal – MC11 Briefing Paper' (Third World Network 2017) 3–5.
[412] Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 18; Goldfarb and Trefler (n 38) 487.
[413] Irion (n 34) 31–32.
[414] Goldfarb and Trefler (n 38) 487; Lee-Makiyama (n 36) 7.
[415] Goldfarb and Trefler (n 38) 488.
[416] Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 18; Asia Business Trade Association, 'FTA Digital Trade Regulations Comparison' (2019) Issue 01-19 4.

3.4 Computing power- and infrastructure-related measures

As recognized by the former US Administration, besides data and algorithms, the computing infrastructure upon which AI systems run plays a strong role in their performance.[417] Advanced computation plays a fundamental role in supporting AI technology and enabling its calculations, because the greater the computing power, the faster data can be fed to train an AI system, and the better the AI system can perform.[418] Indeed, the invention of new architectures (e.g. GPUs, ASICs and FPGAs) that helped exceeding compute limitations of traditional CPUs has significantly contributed to the explosion in capabilities of computationally-intensive AI in the mid-2010s, enabling the development of advanced AI such as deep learning.[419] It is for this reason that, for example, under the American AI Initiative, the US federal agencies are expected to allocate high-performance and cloud computing resources to AI-related applications and R&D.[420]

Computing power generally refers to the speed at which micro-processors, including GPUs and AI-specific micro-processors, process algorithmic calculations. Measures that impact computing power, such as export controls limiting access to vital IT hardware components like microprocessors and semi-conductors[421] and restrictions on cloud computing services, which AI companies can use to outsource the processing of their algorithmic calculations, would impinge on the development, functioning and responsiveness of AI machines. As a result, computing-power measures may indirectly affect trade in AI-powered services, as described in the following scenarios. Let's assume that there are two countries, Country A and Country B, each producing microprocessors that are sold domestically and exported in the other country to AI

[417] US White House, 'Artificial Intelligence for the American People' (*The White House*, 2020) <https://trumpwhitehouse.archives.gov/ai/> accessed 15 December 2020.
[418] Thomas Campbell, 'Artificial Intelligence: An Overview of State Initiatives' (FutureGrasp 2019) 11; Steve Tsou, 'The Need For Computing Power In 2020 And Beyond' (*Forbes*, 24 January 2020) <https://www.forbes.com/sites/forbesbusinesscouncil/2020/01/24/the-need-for-computing-power-in-2020-and-beyond/> accessed 10 November 2021.
[419] Campbell (n 418) 11. See also Chapter 2, Section 2.4.
[420] Notably the US is a world leader in the development of high-performance computing infrastructure that supports AI research. US White House (n 417).
[421] Ferracane, Lee-Makiyama and van der Marel (n 42) 66; Soprana, Marta, 'Extraterritoriality in US - China Relations: The ZTE and Huawei Cases' (2019) XXXIII Diritto del Commercio Internazionale 717.

service suppliers. Under the first scenario, when relations between Country A and Country B are based on free trade, AI services suppliers in Country A supply their services to consumers in their domestic market as well as consumers in Country B. The latter can be served by both domestic AI services suppliers that use microprocessors produced in Country B and by those that use microprocessors produced in Country A, as well as by AI services suppliers from Country A that use microprocessors produced in Country A or that use microprocessors produced in Country B. Under the second scenario, when country A imposes a ban on imports of microprocessors from Country B, AI services suppliers in Country A that use banned microprocessors are left with two options: (i) they can no longer service their domestic market; or (ii) they must find other suppliers of microprocessors in their local market, which could help foster the growth of national champions and domestic producers of microprocessors, or in third country markets, leading to trade diversion in microprocessors. In both cases it is likely that firms in Country A will incur higher operational costs in order to rearrange their supply chain to purchase different microprocessors that would enable them to continue supply their AI-powered services. A similar reasoning applies to AI-powered services suppliers in Country B that use banned microprocessors. If they do not find suitable substitutes for the banned microprocessors, they can no longer supply their services to consumers in country A. Therefore, a ban on microprocessors produced by Country B could result in a *de facto* ban on AI-powered services supplied by foreign suppliers that rely on said prohibited microprocessors to process their algorithmic calculations, to the advantage of those AI services suppliers operating in Country A that use microprocessors produced domestically, which could continue to serve both their domestic market and consumers located in Country A and could now serve a larger segment of the market in Country A, by replacing those AI services suppliers that can no longer access the market. Thus, one could argue that computer power-related measures could have a direct effect on trade in goods and an indirect effect on trade in AI-powered services and, as such, could fall under the purview of both the GATT and the GATS.[422] However, in light of

[422] The AB in the *EC - Bananas III* case clarified that measures that involve a service relating to a particular good or a service supplied in conjunction with a particular good could be found to fall within

the narrow scope of this study, which is limited to the analysis of the relationship between the development of AI governance frameworks and trade in services regulation, any assessment of the treatment of artificial intelligence under the GATT is left to future research.

Computing infrastructure, which includes (1G, 2G, 3G, 4G and 5G) mobile networks, deals with the speed at which data travel from one point to another. Therefore, measures that affect computing infrastructure, such as prohibitions to build 5G mobile networks[423], would impinge on the development, functioning and responsiveness of AI machines and, in turn, could affect trade in AI-powered services. Notably, not all computing infrastructure-related measures might have a negative impact on AI. Indeed, some governments are investing in quantum computing[424], a transformational technology that is focused on applying the laws of quantum physics to computers, with the hope of providing the computational boost needed for AI to develop further,

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the scope of both the GATT and the GATS. The AB reached a similar conclusion also in *Canada - Periodicals.* Thus, both GATT and GATS can apply simultaneously to a measure, but the specific aspects of that measure examined under each agreement could be different. Appellate Body Report, *European Communities — Regime for the Importation, Sale and Distribution of Bananas*, WT/DS27/AB/R, adopted on 25 September 1997 [221]; Appellate Body Report*, Canada — Certain Measures Concerning Periodicals*, WT/DS31/AB/R, adopted on 30 July 1997 [19]; Michael Trebilcock, Robert Howse and Antonia Eliason, *The Regulation of International Trade* (4th edn, Routledge, Taylor & Francis Group 2013) 490.

[423] WTO, Council for Trade in Goods, 'Report (2018) of the Council for Trade in Goods' (21 November 2018)' G/L/1282 17; Tania Voon and Andrew D Mitchell, 'Australia's Huawei Ban Raises Difficult Questions for the WTO | East Asia Forum' (*East Asia Forum*, 22 April 2019) <https://www.eastasiaforum.org/2019/04/22/australias-huawei-ban-raises-difficult-questions-for-the-wto/> accessed 10 November 2021.

[424] Amit Katwala, 'Why China's Perfectly Placed to Be Quantum Computing's Superpower' [2018] *Wired UK* <https://www.wired.co.uk/article/quantum-computing-china-us> accessed 10 November 2021; Innovation, Science and Economic Development Canada, 'Government of Canada Partners with Digital Industries to Invest in Ground-Breaking Technology and Businesses' (*Government of Canada*, 18 April 2019) <https://www.canada.ca/en/innovation-science-economic-development/news/2019/04/government-of-canada-partners-with-digital-industries-to-invest-in-ground-breaking-technology-and-businesses.html> accessed 10 November 2021; European Commission, 'Quantum Technologies Flagship | Shaping Europe's Digital Future' (*Shaping Europe's digital future - European Commission*) <https://digital-strategy.ec.europa.eu/en/policies/quantum-technologies-flagship> accessed 10 November 2021; Ahmed Banafa, 'Quantum Computing and AI: A Transformational Match' (*OpenMind*, 15 March 2021) <https://www.bbvaopenmind.com/en/technology/digital-world/quantum-computing-and-ai/> accessed 10 November 2021; Campbell (n 418) 11.

potentially opening the door to strong AI.[425] In particular, by administering large data sets at much faster speeds and enabling AI technologies to analyse data at a more granular level to identify patterns and anomalies, quantum computing is predicted to help solve the future's big data challenges.[426] However, in light of the narrow scope of this study, further analysis on the impact of quantum computing-related measures on data and trade in AI-powered services is left to future research.

3.5 Concluding remarks

Measures affecting AI were introduced well before recent advances in machine learning and deep neural networks led to a surge in the commercialisation of AI applications across all sectors of the economy in the mid-2010s, and years before governments started to design specific policies addressing the peculiarities of this technology. For instance, restrictions on cross-border data flows, which can affect the ability to access large quantities of data to train AI algorithms and are partly driven by privacy and personal data protection concerns, started as early as the 1990s, when the Internet entered its commercial phase and AI was still two decades away from experiencing its latest 'spring' phase.[427]

However, while data are essential to the functioning of any digital technology, including artificial intelligence, measures relevant to AI extend beyond the realm of data policies. Besides data localisation requirements and data protection laws, measures that affect other critical components of AI, such as algorithms and computing power, also matter for the development of this technology.

AI-related policies may act as barriers to trade in AI-powered services and, thus, fall under the purview of international trade law. For example, restrictions to cross-border

[425] Banafa (n 424); Gil Press, 'Baidu Is Searching For Quantum AI Advantage' (*Forbes*, 26 August 2020) <https://www.forbes.com/sites/gilpress/2020/08/26/baidu-is-searching-for-quantum-ai-advantage/> accessed 10 November 2021.
[426] Brandon Provost and Ji Luo, 'Quantum Computing and The Future of Big Data' (*ISG*) <https://isg-one.com/research/articles/full-article/quantum-computing-and-the-future-of-big-data> accessed 10 November 2021.
[427] Although it should be noted that restrictions on cross-border data flows experienced a significant surge in the early 2010s, when AI technology become increasingly viable for commercial applications. Ferracane (n 307) 2; Raphael Cohen-Almagor, 'Internet History', *Moral, Ethical, and Social Dilemmas in the Age of Technology: Theories and Practice* (Information Science Reference 2013) 20.

data flows, forced access, disclosure, or transfer of source code as a condition for market access, or bans on exports of micro-processors could make it more cumbersome, costly, and time-consuming to export AI-powered services and discourage imports in favour of domestic AI services and service suppliers.

4 Chapter - the Emergence of AI-Specific Policies

4.1 Introduction

In response to the recent widespread commercialization of AI-based products, including AI-powered services, governments have started to pay closer attention to this technology and its potential disruptive effects on the economy, society, and law. Since the mid-2010s several countries have started to develop and adopt a broad range of AI policies that, based on their general purpose, can be broadly distinguished into two categories. At the one end of the spectrum are policies aimed at promoting AI innovation, in the hope of maximizing the benefits accruing from the application of AI across all sectors of the economy. At the other end of the spectrum lie policies aimed at mitigating the risks associated with the increased use of this technology. These AI governance efforts differ from AI-related policies examined in Chapter 3 because they target artificial intelligence specifically and separately from other digital technologies, whereas policies affecting data, algorithms and computing power are relevant to all emerging technologies, including – but not exclusively – AI. Yet, there may be a margin of overlapping and complementarity between these two types of policies.

Most discussions on trade in the XXI century have focused on the analysis of measures restricting cross border flows of data that, albeit recognised as a key component of AI, are crucial to a host of other technologies that, together with AI, enabled the emergence and development of digital trade.[428] But, to the extent that they create potential unnecessary barriers to trade in AI-powered services and discriminate in

[428] Aaronson and Leblond (n 24); Aaronson, 'Data Is Different: Why the World Needs a New Approach to Governing Cross-Border Data Flows' (n 334); Mira Burri, 'Data Flows and Global Trade Law' in Mira Burri (ed), *Big Data and Global Trade Law* (Cambridge University Press 2021); Matthias Bauer and others, 'Unleashing Internal Data Flows in the EU: An Economic Assessment of Data Localisation Measures in the EU Member States' (European Centre for International Political Economy 2016) <https://ecipe.org/publications/unleashing-internal-data-flows-in-the-eu/> accessed 2 March 2021; Ferracane (n 307); Ferracane, Lee-Makiyama and van der Marel (n 42); Ciuriak (n 287); Mitchell and Mishra, 'Regulating Cross-Border Data Flows in a Data-Driven World: How WTO Law Can Contribute' (n 276); Chander and Le (n 295); Neha Mishra, 'When Data Flows Across Borders: Aligning International Trade Law with Internet Policy Objectives' (2019) PhD Thesis; Mitchell and Mishra, 'Data at the Docks: Modernizing International Trade Law for the Digital Economy' (n 276); Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35).

favour of domestic services and services suppliers, generating tension and potential conflict between AI governance objectives and global trade governance principles and goals, AI-specific policies can also be relevant for international trade law.[429] However, save for a few studies of limited scope, this remains a rather unexplored area in existing literature.[430]

This chapter, therefore, is dedicated to determining how this emerging trend in AI governance initiatives relates to international trade law, an assessment that is crucial to understand whether the latter may contribute to reducing the policy space governments have to regulate AI. To do so, the chapter explores how governments have responded to the recent surge in AI applications in the realm of services, what the main drivers of such responses were, what types of measures governments adopted, what the key differences and similarities in governmental action are, and what the actual (and potential) impact of these measures is on digital trade, especially on trade in AI-powered services.

For the purposes of this research, the analysis focuses on a representative sample of AI-specific governmental policies – designed, adopted, or implemented by governments in the last decade - that are most likely to have an impact on trade in AI-powered services. Since the widespread commercialization of AI is a rather recent phenomenon, and these AI governance efforts are in their infancy stage, the analysis considers measures at different stages of development, with examples of both hard law (e.g., binding domestic regulations) and soft law (e.g., non-binding policies, guidelines and principles) to take into account the different levels of regulatory development among countries. Measures taken in response to potential threats that AI poses to the democratic process, criminal liability, and international humanitarian law fall outside the scope of this study.

[429] Zhang and Shang (n 37).
[430] Irion and Williams (n 30); Chander (n 32); Shin-Yi Peng, Lin, Ching-Fu and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law | International Economic and Trade Law, WTO Law* (Cambridge University Press 2021); Irion (n 34).

4.2 The emergence of AI governance frameworks

Spurred by the exponential growth in large quantities of data that can be used to train AI algorithms, higher computing power, and access to a greater pool of human resources having the necessary skills and expertise to develop AI algorithms and models, in the early 2010s artificial intelligence entered a new phase of growth and expansion that resulted in a surge in AI applications for commercial purposes.

This new AI 'spring' did not go unnoticed by governments, who recognized the opportunities that the widespread use of this technology could unleash. For example, the US acknowledged that AI is a tool that has the potential to change and transform every sector of their economy and society.[431] Likewise, the EU recognized that "AI is a strategic technology that offers many benefits for citizens, companies and society as a whole".[432] According to the National Institution for Transforming India (NITI Aayog), the policy think tank of the Indian government tasked with establishing a National Program on Artificial Intelligence[433], AI is a "once-in-a-generation phenomenon" that has the potential to provide large incremental value to a wide range of sectors.[434] Other countries have shared similar views, referring to AI as "the next frontier of technological opportunities"[435], "a huge global opportunity"[436], the technology that is "changing societies and economies around the world"[437], and "an opportunity to restore economic vitality and solve many issues facing our society"[438].

However, as described in Chapter 2, advances in AI also sparked concerns about the potential ethical and socio-economic risks associated with the widespread use of this

[431] National Artificial Intelligence Initiative Act 2020, H.R. 6216 - 116th Congress (2019-2020) Sec. 2(1). This Bill is incorporated into Division E of the National Defense Authorization Act for Fiscal Year 2021, H.R.6395 – 116th Congress (2019-2020).
[432] European Commission, 'EU White Paper on Artificial Intelligence' (n 69) 25.
[433] NITI Aayog (n 71) 5.
[434] ibid 7.
[435] Smart Nation Singapore, 'National Artificial Intelligence Strategy' (Government of Singapore 2019) 7.
[436] Department of Business, Energy & industrial Strategy and Department for Digital, Culture, Media & Sport, 'Artificial Intelligence Sector Deal' (*GOV.UK*, 2019) <https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal> accessed 15 December 2020.
[437] Dawson and others (n 74) 4.
[438] The Government of South Korea, 'National Strategy for Artificial Intelligence' (Ministry of Science and ICT, Artificial Intelligence Policy Division 2019) 11.

technology, such as discrimination, error, misuse of personal data, and potential job displacement. As a result, artificial intelligence is now "at the top of policy agendas for governments and other stakeholder groups at both national and international levels" and multiple jurisdictions across the world have started to slowly roll out policies and measures aimed at establishing an AI governance framework.[439]

As these initiatives are still in their infancy and rapidly evolving, efforts to identify, categorise and analyse AI-specific policies are relatively limited. For example, the Digital Policy Alert, a database of policy changes that affect cross-border digital commerce developed by Global Trade Alert in January 2021, contains valuable information on policies affecting machine learning and AI development providers.[440] Also, since 2018 the Stanford's Institute for Human-Centered Artificial Intelligence publishes an AI Index Report that includes information on AI policies and national strategies, with a focus on US legislation.[441] This research, however, draws heavily from the OECD AI Policy Observatory that, at present, constitutes one of the most reliable, comprehensive, and updated repositories of information on AI policies.[442]

According to the OECD database, about 60 countries, territories and the EU[443] have started to adopt and implement policies specifically dedicated to artificial intelligence since the mid-2010s.[444] The over 600 AI policy instruments listed in the OECD repository as of mid-2021 include 'governance' tools (e.g. national strategies, agendas

[439] OECD AI Policy Observatory, 'Countries & Initiatives Overview' (*OECD AI Policy Observatory*, 2021) <https://www.oecd.ai/countries-and-initiatives> accessed 5 March 2021; Butcher and Beridze (n 40) 88.
[440] 'Digital Policy Alert' (*Global Trade Alert*, 2021) <https://www.globaltradealert.org/digital_policy> accessed 29 December 2021.
[441] Daniel Zhang and others, 'The AI Index 2021 Annual Report' (AI Index Steering Committee, Human-Centered AI institute, Stanford University 2021) <https://aiindex.stanford.edu/report/> accessed 29 December 2021.
[442] The OECD AI Policy Observatory (OECD.AI) is an inclusive platform for public policy on AI that combines resources from across the OECD, its partners, and all stakeholder groups. Its purpose is facilitating dialogue between stakeholders while providing multidisciplinary, evidence-based policy analysis in the areas where AI has the most impact. 'OECD.AI (2021), Powered by EC/OECD (2021), STIP Compass Database, Accessed on 25/03/2021'.
[443] They include all individual EU Member States, other OECD Members (e.g., Canada, Israel, Japan, Korea, United Kingdom, and United States) and a few non-OECD economies (e.g., China, Costa Rica, Egypt, Kazakhstan, Thailand, and Vietnam).
[444] OECD, 'The OECD Artificial Intelligence Policy Observatory' (2020) <https://www.oecd.ai/> accessed 17 August 2020.

and plans and establishment of regulatory oversight and ethical advice bodies), 'direct financial support' (e.g. grants for business R&D and innovation, equity financing, procurement programmes for R&D and innovation), 'soft and physical collaborative infrastructures' (e.g. information services and access to datasets, dedicated support to research infrastructures), and 'guidance, regulation and incentives' (e.g. emerging technology regulation, labour mobility regulation and incentives).[445]

Initiatives related to 'AI Governance' make up the bulk of AI policy instruments implemented so far by governments.[446] A breakdown of the almost 200 national strategies, agendas and plans listed in the OECD repository shows that they tend to focus on three key areas (i.e. business innovation and entrepreneurship, governance, and research), with digitalisation, business innovation, skills for research and innovation, and technology transfer and commercialisation identified as main priorities for action.[447] Besides public administration, national AI policies target most frequently four business sectors, namely healthcare, telecommunications, automotive and road transports.[448] Since about one third of the initiatives expect public bodies to plan activities based on the strategies presented, it is possible that current AI policies that are shaped as soft law instruments may result in more binding, hard law legal instruments in the near future.

Emerging technology regulation also appears among the policy instruments that governments have made more use of so far. The OECD AI Policy repository contains over 130 initiatives mostly adopted at national level, creating a patchwork of policies of different scope and depth.[449] Focused mainly on addressing risks to human safety, privacy protection, and unethical use of AI, emerging technology regulation appears more frequently either in the form of formal law or regulation, or as self-regulation

[445] 'OECD.AI (2021), Powered by EC/OECD (2021), STIP Compass Database, Accessed on 25/03/2021' (n 442).
[446] OECD AI Policy Observatory, 'National Strategies, Agendas and Plans' (*OECD AI Policy Observatory*, 2021) <https://www.oecd.ai/dashboards/policy-instruments/National_strategies_agendas_and_plans> accessed 5 March 2021.
[447] ibid.
[448] ibid.
[449] 'OECD.AI (2021), Powered by EC/OECD (2021), STIP Compass Database, Accessed on 25/03/2021' (n 442).

(e.g. codes of conduct, voluntary standards).[450] Examples of the former can be found in Canada's Directive on Automated Decision-Making[451], Japan's legalisation of autonomous driving technology[452], and US regulations on facial recognition technology.[453] The OECD AI Policy Observatory considers the EU's Ethics Guidelines on AI, Korea's Ethics Guidelines for Intelligent Information Society, and Singapore's Model AI Governance Framework as examples of self-regulation.[454]

Additional insight on national AI governance efforts comes from a study supported by the Centre for Artificial Intelligence and Robotics of the United Nations Interregional Crime and Justice Research Institute (UNICRI).[455] From the analysis of 41 countries that, in the period early 2017-June 2019, undertook AI-related action, either by releasing framework documents (e.g. Australia, Canada, China, Singapore, United States) or by demonstrating interest in adopting an AI national strategy or plan (e.g. India, Russian Federation), it emerges that half of them matched these actions with government investments in AI, with China and Saudi Arabia ranking highest for allocated AI funding (over US$10 billion each).[456] The study also shows that ethics and legal aspects of artificial intelligence feature among the most dominant interest areas in AI national strategies and plans, behind research, skills capabilities and industrial strategy.[457]

Besides pursuing the establishment of AI governance frameworks at national level, governments have also started to engage in international collaborations in an effort to

[450] OECD AI Policy Observatory, 'Emerging Technology Regulation AI Strategies and Policies' (*OECD AI Policy Observatory*, 2021) <https://www.oecd.ai/dashboards/policy-instruments/Emerging_technology_regulation> accessed 9 March 2021.
[451] Directive on Automated Decision-Making, Government of Canada, enacted on February 5, 2019.
[452] Dan Matsuda, Edward Mears and Yuji Shimada, 'Legalization of Self-Driving Vehicles in Japan: Progress Made, but Obstacles Remain' (*DLA Piper*, 18 June 2019) <https://www.dlapiper.com/en/global/insights/publications/2019/06/legalization-of-self-driving-vehicles-in-japan/> accessed 9 March 2021.
[453] Facial Recognition - State and Local Government, Washington State 2020 (SB 6280).
[454] OECD AI Policy Observatory, 'Policy Initiatives for Emerging Technology Regulation, Type(s) of Regulation: Self-Regulation (e.g. Codes of Conduct, Scientific Advice, Standards)' (*OECD AI Policy Observatory*, 2021) <https://www.oecd.ai/policy-initiatives> accessed 9 March 2021.
[455] Campbell (n 418) 13, 28.
[456] ibid 28.
[457] Ibid 29.

develop common approaches to AI regulation. The Future of Life Institute (FLI)[458], which provides further information on AI policies recently adopted across the world, with references to national AI plans in the pipeline for Argentina, Malaysia and Tunisia[459], calls attention to a few bilateral and regional collaborations on AI.[460] For instance, in 2018 India and the United Arab Emirates signed a Memorandum of Understanding establishing a partnership on AI to design mutually favourable regulatory frameworks and policies that do not become outpaced by the speed of technological developments, and create the enabling nurturing environment for AI development, through regulatory sandboxes and sharing of best practices, and R&D collaboration.[461] Similarly, countries in the Nordic-Baltic Region issued a declaration of collaboration on AI with a focus on skill development, data access, standards and principles and avoidance of unnecessary regulation.[462]

The OECD is, to a certain degree, at the forefront of these international AI governance efforts. In May 2019 its members and a few non-OECD countries[463] adopted the OECD AI Principles[464], the first set of intergovernmental policy guidelines on AI signed up by governments. [465] These principles formed the basis of subsequent international

[458] The FLI is a non-profit organization dedicated to catalysing and supporting "research and initiative for safeguarding life and developing optimistic visions of the future, including positive ways for humanity to steer its own course considering new technologies and challenges". Its activities focus on artificial intelligence, existential risk, nuclear weapons, biotech, and climate. Among its founders is Jaan Tallinn, co-founder of Skype. Notable AI experts Nick Bostrom, Erik Brynjolfsson and Stuart Russell, and AI entrepreneur Elon Musk are members of the Institute's Scientific Advisory Board. For more information see Future of Life Institute, 'Who We Are' (*Future of Life Institute*) <https://futureoflife.org/team> accessed 4 March 2021.

[459] The OECD repository on AI policies does not cover these countries.

[460] Future of Life Institute, 'National and International AI Strategies' (*Future of Life Institute*) <https://futureoflife.org/national-international-ai-strategies/> accessed 4 March 2021.

[461] Aarti Nagraj, 'UAE, India Sign MoU for Artificial Intelligence, Aim to Generate $20bn in Benefits' (*Gulf Business*, 29 July 2018) <https://gulfbusiness.com/uae-india-sign-mou-artificial-intelligence-aim-generate-20bn-benefits/> accessed 9 March 2021.

[462] Future of Life Institute, 'National and International AI Strategies' (n 460).

[463] Argentina, Brazil, Colombia, Costa Rica, Peru and Romania.

[464] Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449 2019.

[465] OECD, 'Forty-Two Countries Adopt New OECD Principles on Artificial Intelligence' (22 May 2019) <http://www.oecd.org/going-digital/forty-two-countries-adopt-new-oecd-principles-on-artificial-intelligence.htm> accessed 9 March 2021.

initiatives, as exemplified by the human-centred AI principles adopted in June 2020 by the G20 members.[466]

Individual governments are not alone in working on challenges related to AI and making efforts "to ensure that the technology is effectively governed", as evidenced by the recent emergence of several multi-stakeholders initiatives.[467] The most notable are the 'AI for Good Global Summit', the 'Global Partnership on Artificial Intelligence (GPAI)', the 'Partnership on AI' and the 'Global Initiative on Ethics of Autonomous and Intelligent Systems'.

The United Nations first launched the 'AI for Good Global Summit' in 2017, presenting it as the organization's leading multi-stakeholder interdisciplinary platform for global and inclusive dialogue on AI.[468] Organized by the International Telecommunications Union (ITU) with XPRIZE Foundation in partnership with other UN agencies, and ACM, it aims to build a common understanding of the capabilities of emerging AI technologies and accelerate the development of AI solutions towards achieving the Sustainable Development Goals (SDGs).[469]

The GPAI, launched by Canada and France in 2020 on the basis of an idea developed within the G7, is a multi-stakeholder initiative aimed at "provid[ing] a mechanism for sharing multidisciplinary research and identifying key issues among AI practitioners, with the objective of facilitating international collaboration, reducing duplication, acting as a global reference point for specific AI issues, and ultimately promoting trust in and the adoption of trustworthy AI" in congruence with the UN SDGs.[470] The GPAI initiative focuses on four thematic areas: (i) responsible AI, which refers to the responsible development, use and governance of human-centred AI systems, and aims to develop

[466] G20 AI Principles, Annex to G20 Osaka Leaders' Declaration 2020.
[467] Butcher and Beridze (n 40) 91.
[468] ITU, 'United Nations Activities on Artificial Intelligence' (United Nations 2019) vi.
[469] ibid; ITU, 'Artificial Intelligence - The AI for Good Global Summit' (*International Telecommunication Union*, 2021) <https://www.itu.int/en/action/ai/Pages/default.aspx> accessed 5 March 2021.
[470] GPAI's 15 founding members are Australia, Canada, France, Germany, India, Italy, Japan, Mexico, New Zealand, the Republic of Korea, Singapore, Slovenia, the United Kingdom, the United States, and the European Union, later joined by Brazil, the Netherlands, Poland and Spain in December 2020. 'About GPAI' (*GPAI - The Global Partnership on Artificial Intelligence*) <https://www.gpai.ai/about/> accessed 9 March 2021.

practical multistakeholder frameworks for specific applications for responsible AI[471]; (ii) data governance, which focuses on "promoting data for AI being collected, used, shared, archived and deleted in ways that are consistent with human rights, inclusion, diversity, innovation, economic growth, and societal benefit"[472]; (iii) the future of work, which explores "how AI can be used in the workplace to empower workers and increase productivity"[473]; and (iv) innovation and commercialization, which focuses on specific issues related to establishing trust in AI systems that are commercialized and the "tools and methods that enable private actors and research organizations to drive international collaboration on AI R&D and innovation, to develop research outputs into products and processes, and to transfer these results to industry for commercialisation, with a special focus on SMEs".[474]

In 2016 a consortium of leading US tech corporations[475] established the 'Partnership on AI', a multi-stakeholder initiative aimed, among others, at developing and sharing best practices on AI technologies, "addressing such areas as fairness, inclusivity, explanation and transparency, security and privacy, values and ethics, collaboration between people and AI systems, interoperability of systems, and of the trustworthiness, reliability, containment, safety, and robustness of the technology".[476]

In the same year, the Institute for Electrical and Electronics Engineers (IEEE) launched the multi-stakeholder 'Global Initiative on Ethics of Autonomous and Intelligent Systems' "to ensure [that] every stakeholder involved in the design and development of autonomous and intelligent systems is educated, trained, and empowered to

[471] 'Responsible AI - GPAI' (*GPAI - The Global Partnership on Artificial Intelligence*) <https://www.gpai.ai/projects/responsible-ai/> accessed 9 March 2021.
[472] 'Data Governance - GPAI' (*GPAI - The Global Partnership on Artificial Intelligence*) <https://www.gpai.ai/projects/data-governance/> accessed 9 March 2021.
[473] 'Future of Work - GPAI' (*GPAI - The Global Partnership on Artificial Intelligence*) <https://www.gpai.ai/projects/future-of-work/> accessed 9 March 2021.
[474] 'Innovation and Commercialization - GPAI' (*GPAI - The Global Partnership on Artificial Intelligence*) <https://www.gpai.ai/projects/innovation-and-commercialization/> accessed 9 March 2021.
[475] Apple, Amazon, DeepMind and Google, Facebook, Microsoft and IBM are among the original founders of the Partnership on AI. 'About Us' (*The Partnership on AI*) <https://www.partnershiponai.org/about/> accessed 8 March 2021.
[476] ibid.

prioritize ethical considerations so that these technologies are advanced for the benefit of humanity."[477]

The private sector has also been engaged in addressing concerns related to the development of AI technology, with multiple companies publishing their own frameworks for AI governance. For example, DeepMind launched an Ethics & Society research unit dedicated to "help technologists put ethics into practice" and guide the responsible deployment of AI.[478] Google and Microsoft published their own 'AI Principles', to "guide the development and use of AI"[479] and advance ethics-driven AI.[480] These are also examples of self-regulation.

4.3 Reasons behind adoption of AI-specific policies and strategies

Governments have advanced different reasons to justify their decision to adopt strategies, policies and regulations specifically dedicated to artificial intelligence. For example, several governments have started to intervene to build AI capacity and promote AI innovation and deployment, acknowledging the potential benefits arising from the use of artificial intelligence across a wide variety of sectors, including services.[481] At the one end of the spectrum lie countries like China and the United States, which are already rich in the capital and labour inputs necessary for the widespread use of AI technology and aim primary at taking the lead in the AI race.[482] China's AI strategy finds its roots in 'Made in China 2025', a 10-year action plan launched in 2015, where the Chinese government explicitly acknowledged the need to

[477] IEEE, 'IEEE SA - The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems' (2017) <https://standards.ieee.org/industry-connections/ec/autonomous-systems.html> accessed 12 February 2021.
[478] Sean Legassick and Verity Harding, 'Why we launched DeepMind Ethics & Society' (*Deepmind*, 3 October 2017) </blog/announcements/why-we-launched-deepmind-ethics-society> accessed 8 March 2021.
[479] Google, 'Artificial Intelligence at Google: Our Principles' (*Google AI*) <https://ai.google/principles/> accessed 8 March 2021.
[480] 'Responsible AI Principles from Microsoft' (*Microsoft*) <https://www.microsoft.com/en-us/ai/responsible-ai> accessed 8 March 2021.
[481] See, for example, US National Science and Technology Council, 'The National Artificial Intelligence Research and Development Strategic Plan' (Executive Office of the President of the United States 2016).
[482] China has a comparative advantage on data, resulting from the high volume of digital information produced by its immense population, while the United States is the undisputed leader in AI research. For more on the AI race between the two countries see Lee (n 106).

urgently improve China's ability to innovate and grasp cutting edge technologies upon which both developed and developing countries are reshaping their competitiveness.[483] As part of this plan, the government published its first AI national strategy, the 'Next Generation of Artificial Intelligence Development Plan', two years later.[484] Enacted to "seize the major strategic opportunities for the development of artificial intelligence, build China's first-mover advantage in artificial intelligence development, accelerate the construction of innovative countries and the world's science and technology power", the Chinese AI national strategy has three key objectives: (i) keeping up the overall technology and application of AI to the level of the rest of the world by 2020; (ii) making artificial intelligence the main driving force of China's industrial upgrading and economic transformation, and make positive progress in the construction of an AI society by 2025; and (iii) making China become the major AI innovation centre of the world and a leading economic power by 2030.[485]

Faced with China's competition in artificial intelligence, multiple US Administrations in recent years have reiterated their interest in strengthening the country's leading position in AI. In 2016, under President Obama, the National Science and Technology Council issued the 'National Artificial Intelligence Research and Development Strategic Plan, recommending long-term investments in AI research in order to "enable the United States to remain a world leader in AI".[486] The following US Administration was even more explicit in its approach, as evidenced by the issuing of E.O. 13859, which called for the continuation of American leadership in AI as "of paramount importance to maintaining the economic and national security of the United States and to shaping the global evolution of AI in a manner consistent with [the] Nation's values, policies,

[483] Linked to the new (digital) Silk Road, "Made in China 2025" was launched in 2015 as the country's first 10-year action plan aimed at transforming China into a leading manufacturing power by 2049. It is founded on a three-step strategy that includes promoting service-oriented manufacturing and manufacturing-related service industries, including bio-medicine and high-end numerically controlled machine tools and robots. State Council of the People's Republic of China (n 281); Fabian Westerheide, 'China – The First Artificial Intelligence Superpower' (*Forbes*, 14 January 2020) <www.forbes.com/sites/cognitiveworld/2020/01/14/china-artificial-intelligence-superpower/> accessed 14 July 2020.
[484] State Council of the People's Republic of China (n 281).
[485] ibid.
[486] US National Science and Technology Council (n 481) 3.

and priorities".[487] In its 'National Strategy for Critical and Emerging Technologies', the US Administration called for the United States to maintain leadership in critical and emerging technologies (including AI)[488] by promoting its National Security Innovation Base[489] and protecting its technological advantage.[490] In February 2021 the US National Security Commission on Artificial Intelligence (NSCAI)[491] issued its final report highlighting how "America's technological predominance—the backbone of its economic and military power—is under threat" from China and recommending the government to take actions "to promote AI innovation to improve national competitiveness and protect critical U.S. advantages".[492]

Besides China and the United States, other countries with IT capabilities and talent have also expressed an interest in positioning themselves in a leadership position in the AI field. India, for example, has laid out its strategy to become the "solution provider of choice for the emerging and developing economies (excluding China) across the globe" by acting as the 'AI Garage for 40% of the world'.[493] India aims to become both the playground for the development of AI scalable solutions that can be implemented in other developing countries, as well as a AIaaS supplier across the globe.[494] In other words, India intends to leverage AI for economic growth and social

[487] Executive Order on Maintaining American Leadership in Artificial Intelligence, E.O. 13859 of February 11, 2019.
[488] Artificial intelligence is one of the 20 technology areas identified as 'critical and emerging technologies', alongside advanced computing, communication and networking technologies, data science and storage, human-machine interfaces, quantum information science and semiconductors and microelectronics. White House, 'National Strategy for Critical and Emerging Technologies' (2020) Annex A.
[489] The National Security Innovation Base is defined as "the American network of knowledge, capabilities, and people – including academia, National Laboratories, and the private sector – that turns ideas into innovations, transforms discoveries into successful commercial products and companies, and protects and enhances the American way of life". ibid 1.
[490] White House (n 488).
[491] Established in 2018, NSCAI is an independent Commission of 15 members tasked with considering the methods and means necessary to advance the development of artificial intelligence, machine learning, and associated technologies to comprehensively address the national security and defence needs of the United States. Former Google's CEO Erich Schmidt chairs NCAI. John S. McCain National Defense Authorization Act, Section 1051 for Fiscal Year 2019 (P.L. 115-232); 'About' (*National Security Commission on Artificial Intelligence*) <https://www.nscai.gov/about/> accessed 10 March 2021.
[492] National Security Commission on Artificial Intelligence, 'Final Report' (National Security Commission on Artificial Intelligence 2021) 7–8.
[493] NITI Aayog (n 71) 18.
[494] ibid 19.

development and enhance its leadership position in this technology among developing and emerging economies.[495] South Korea declared its intent to achieve 95 per cent of AI technology competitiveness by 2030, from its current 82 per cent, establishing a global leading AI ecosystem under the vision "toward AI world leader beyond IT".[496] The European Union, on the other hand, aims to become "the champion of an approach to AI that benefits people and society as a whole" and "the leader in the AI revolution, in its own way and based on its values", building on its recognised leadership in robotics and AI research.[497] In its 2021 review of the Coordinated Plan on Artificial Intelligence, the EU Commission clarified that achieving EU global leadership on trustworthy AI would require it to work together with Member States and private actors to: (i) accelerate investments in AI technologies to drive resilient economic and social recovery facilitated by the uptake of new digital solutions; (ii) act on AI strategies and programmes by implementing them fully and in a timely manner to ensure that the EU reaps the full benefits of first-mover adopter advantages; and (iii) align AI policy to remove fragmentation and address global challenges.[498]

At the other end of the AI race spectrum are countries at a less advanced stage of AI development. They aim at building or upgrading their capacity in order to take advantage of the potential socio-economic benefits accruing from a more widespread use of this technology and, in part, to become less dependent on foreign AI products and services. For instance, the Vietnamese Ministry of Information and Communications has called for the development of preferential policies aimed at training and developing talents in AI to ensure that Vietnam can "have its own direction for the AI industry […] [and] take advantage of opportunities to catch up with

[495] ibid 7.
[496] The Government of South Korea (n 438) 16.
[497] European Commission, 'Communication from the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions - Artificial Intelligence for Europe' (European Commission 2018) (COM(2018) 237 Final 2, 6, and 19.
[498] European Commission, 'Coordinated Plan on Artificial Intelligence 2021 Review - ANNEXES to the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions Fostering a European Approach to Artificial Intelligence' (2021) COM(2021) 205 Final 2.

advanced countries".[499] Thailand has also acknowledged the importance of increasing AI capabilities to support the country's development. Its Twelfth National Economic and Social Development Plan (2017-2021) recognizes the key role that fostering science, technology, R&D and innovation plays in "empowering the development of all aspects needed to increase the country's competitiveness with the exceedingly competitive global economy" and how increasing the country's capability in high technology, including in the field of digital, IoT, AI and embedded systems industries is the way forward.[500] Acknowledging that innovation is critical to its future opportunities and that the country is part of a global innovation race, Australia is also moving to develop advanced capability in AI and machine learning to ensure growth of the digital economy and avoid being left behind by other countries.[501]

Concerns about the potential risks associated with the use of artificial intelligence have also induced some governments to intervene. For instance, Canada has adopted a Directive on Automated Decision-Making to ensure that AI systems are deployed "in a manner that reduces risks to Canadians and federal institutions".[502] Likewise, the European Union has recognized potential drawbacks of AI technology and the need to mitigate the risks associated with it. Indeed, following a 2018 Communication which identified the establishment of 'an appropriate ethical and legal framework' as one of the three pillars of the European approach to AI[503], the EU Commission issued a White Paper on Artificial Intelligence in 2020 declaring that it "supports a regulatory and investment oriented approach with the twin objective of promoting the uptake of AI

[499] Ministry of Information and Communications of the Socialist Republic of Vietnam, 'Selecting appropriate artificial intelligence development strategy' (*Ministry of Information and Communications of the Socialist Republic of Vietnam*, 2019) <https://english.mic.gov.vn:443/Pages/TinTuc/tinchitiet.aspx?tintucid=139578> accessed 11 March 2021.
[500] The Twelfth National Economic and Social Development Plan (2017-2021), Government of Thailand 2017 1, 18.
[501] Though clearly at a more advanced stage of AI development than Thailand of Vietnam, Australia is not yet a major player in the AI race like the US or China. Innovation and Science Australia, 'Australia 2030: Prosperity through Innovation' (Australian Government 2017).
[502] Directive on Automated Decision-Making, Government of Canada, enacted on February 5, 2019.
[503] European Commission, 'Communication from the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions - Artificial Intelligence for Europe' (n 497).

and of addressing the risks associated with certain uses of this new technology".[504] The EU Commission went on to clarify which are the major risks related to the use of AI that it aims at addressing (i.e. risks for fundamental rights, including personal data and privacy protection, and non-discrimination; and risks for safety and the effective functioning of the liability regime), highlighting the material (e.g. safety and health of individuals, including loss of life, damage to property) and immaterial harm (e.g. loss of privacy, limitations to the right of freedom of expression, human dignity, discrimination for instance in access to employment) that AI technology could cause in the absence of an adequate legal and regulatory framework.[505] In April 2021 the EU Commission circulated a proposal for a Regulation laying down harmonised rules on AI (Artificial Intelligence Act) centred on a well-defined risk-based regulatory approach aimed at protecting the fundamental rights enshrined in the EU Charter of Fundamental Rights from the various sources of risk resulting from the use of certain AI systems.[506] It differentiates AI systems based on the risk that their use creates: (i) unacceptable risk (prohibited AI systems); (ii) high risk to the health and safety or fundamental rights of natural persons (permitted AI systems subject to compliance with mandatory requirements and an ex-ante conformity assessment); and (iii) low or minimum risk (permitted AI systems subject to very limited transparency obligations).

Albeit governments have justified their recent AI governance efforts on the basis of their desire to promote AI innovation to foster economic growth and their need to mitigate potential risks associated with the use of artificial intelligence, one could argue that, in some cases, the adoption of AI-specific policies may hide a protectionist intent, such as the nurturing of national AI champions, disguised behind the pursuit of a legitimate public policy objective.

[504] European Commission, 'EU White Paper on Artificial Intelligence' (n 69) 1.
[505] ibid 10–11.
[506] EU Artificial Intelligence Act 1, 3, 11.

4.4 Scope and depth of AI policy measures

Based on information collected in the OECD AI Repository, three categories of AI-specific measures appear more likely to affect trade in AI-powered services: (i) ethics-related policies; (ii) the development of AI standards; and (iii) AI-specific subsidies.

4.4.1 Ethics-related principles and guidelines

Recent developments in AI and its increased commercialization have sparked ethical concerns about AI trustworthiness and its impact on society. This has resulted in the development of sets of AI principles and guidelines for the promotion of the ethical design, development, and use of artificial intelligence by several individual governments and other AI actors, including international organizations, private firms, and the civil society.[507]

Whilst some scholars have acknowledged that similarities abound among the different AI principles adopted so far across the globe, leading to a certain degree of convergence across a sub-set of principles, harmonization has yet to be achieved. According to Jobin, Ienca and Vayena, transparency, justice and fairness, non-maleficence, responsibility (including accountability), and privacy are the AI ethical principles most frequently mentioned, albeit substantive differences emerge regarding their interpretation, importance, scope of application and implementation.[508] Similar findings emerge from the work of Fjeld et al., who added that sets of AI principles released more recently tend to cover also human control of technology, and promotion of human values.[509] In her work on data ethics, Mishra identified four broad categories of principles: (i) protection of human rights (i.e. human-centric approach based on the protection of the dignity and of individual rights of individuals); (ii) ethical design (i.e. technical designs and standards underlying data-driven technologies must comply with basic human rights); (iii) algorithmic accountability (i.e. digital technology suppliers

[507] 'AI Principles' (*AI Ethicist*) <https://www.aiethicist.org/ai-principles> accessed 18 March 2021.
[508] Anna Jobin, Marcello Ienca and Effy Vayena, 'The Global Landscape of AI Ethics Guidelines' (2019) 1 Nature Machine Intelligence 389.
[509] Jessica Fjeld and others, 'Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-Based Approaches to Principles for AI' (Berkman Klein Center Research Publication 2020) 2020–1.

should be able to explain the how their algorithms and technical designs use and process data to generate certain results, and, if and when needed, rectifiable to ensure compliance with laws and regulations); and (iv) privacy and security.[510]

The OECD AI Principles constitute the primary example of international cooperation for the development of (non-binding) rules regulating innovation, deployment, and use of artificial intelligence. Recognizing that "trust is a key enabler of digital transformation [and] that […] the trustworthiness of AI systems is a key factor for the diffusion and adoption of AI", in May 2019 OECD Members adopted a set of five values-based AI Principles for the responsible stewardship of trustworthy AI and five recommendations for policy makers to implement in their national policies and international cooperation.[511] According to these principles, AI systems[512] should be designed to respect the rule of law, human rights and democratic values (including freedom privacy and data protection, non-discrimination and equality, and fairness) and should include appropriate mechanisms and safeguards including capacity for human intervention.[513] The OECD AI Principles also focus on the importance of transparency of AI systems, calling for the disclosure of information regarding when AI systems are used, and their explainability, suggesting AI actors[514] across all sectors of the economy, including services, provide people affected by the outcome of an AI system with information on the logic and factors that led to said outcome, to the extent possible.[515] OECD Members also acknowledged that trustworthy artificial intelligence requires AI systems to be robust, secure and safe throughout their entire lifecycle.[516] This means that AI systems should withstand or overcome adverse conditions, including digital security risks, and should not pose unreasonable safety risks, including

[510] Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 7, 10, 15.
[511] Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.
[512] The OECD defines an 'AI system' as "a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy." ibid.
[513] Principle 1.2. OECD, 'The OECD Artificial Intelligence (AI) Principles' (*OECD AI Policy Observatory*, 2021) <https://www.oecd.ai/ai-principles> accessed 18 March 2021.
[514] AI actors are those who play an active role in the AI system lifecycle, from design to operation and monitoring, including organisations and individuals that deploy or operate AI. Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.
[515] Principle 1.3. OECD, 'The OECD Artificial Intelligence (AI) Principles' (n 513).
[516] Principle 1.4. Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.

to physical security, in conditions of normal use, foreseeable use or misuse.[517] In order to fulfil this principle OECD Members recommend that AI actors ensure traceability and apply a systematic risk management approach.[518] Traceability, which focuses on maintaining records of data characteristics (e.g. metadata, data sources and data cleaning) rather than the data themselves, can help analyse and inquiry into the outcomes of AI systems, prevent future mistakes and improve trustworthiness of AI systems.[519] A risk management approach, on the other hand, "can help identify, assess, prioritise and mitigate potential risks that can adversely affect a system's behaviour and outcomes".[520] Included among the OECD AI Principles are also accountability, which refers to the need for AI actors to be held accountable for the proper functioning of AI systems and for the respect of all other principles[521], and the recognition that countries should prioritize the development and use of AI that can benefit people as well as the planet and that trustworthy AI plays a key role in advancing inclusive growth, sustainable development and well-being.[522]

Although its AI Principles were adopted in their entirety by the G20 group[523], as of November 2021, the OECD remains the only governmental international organization to have formally issued principles for the development of ethical AI.[524] However, several individual countries adopted their own sets of AI principles, bearing a certain degree of similarity to the OECD approach in terms of both scope and aspiration. For example, in April 2019 the EU High-Level Expert Group on AI presented its Ethics Guidelines for Trustworthy AI, containing four ethical principles, rooted in fundamental rights, and a non-exhaustive list of requirements aimed at ensuring that AI systems

[517] OECD, 'The OECD Artificial Intelligence (AI) Principles' (n 513).
[518] Principle 1.4. Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.
[519] OECD, 'The OECD Artificial Intelligence (AI) Principles' (n 513).
[520] ibid.
[521] Principle 1.5. Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.
[522] Principle 1.1. ibid.
[523] G20 AI Principles, Annex to G20 Osaka Leaders' Declaration.
[524] The only exception is the Council of Europe that, in 2018, adopted the 'European Ethical Charter on the Use of AI in Judicial Systems', whose scope of application extend beyond the focus of this research. European Commission for the Efficiency of Justice, 'European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and Their Environment' (Council of Europe 2018).

are developed, deployed and used in a trustworthy manner.[525] The ethical principles refer to the respect of human autonomy (i.e. humans interacting with AI systems must be able to keep full and effective self-determination over themselves, design of AI systems should be human-centric, and work processes in AI systems should be subject to human oversight) , the prevention of harm (i.e. AI systems should not cause harm to or adversely affect human beings), fairness, and explainability.[526] The requirements include human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being and accountability.[527] These principles apply horizontally to all economic sectors, including services.

China followed suit with its own set of principles for AI governance and responsible AI produced by the National New Generation Artificial Intelligence Governance Expert Committee and released in June 2019 by the Ministry of Science and Technology (MOST).[528] Setting out to promote the healthy development of a new generation of AI and ensure that AI is safe/secure, reliable, and controllable, China established that AI actors across all sectors of the economy, including services, should adhere to the eight principles for the development of responsible AI, which either recall the OECD AI principles and recommendations (i.e. fairness and justice, respect of privacy, security/safety and controllability, shared responsibility) or add to them (i.e. harmony and friendliness, inclusivity and sharing, open collaboration, and agile governance).[529]

in November 2019 the Australian government published its AI Ethics Framework containing a set of eight voluntary AI Ethics Principles for public and privacy entities across all sectors to follow when designing, developing, integrating or using AI systems in order to "achieve better outcomes, reduce the risk of negative impact, and practice

[525] High-Level Expert Group on Artificial Intelligence, 'Ethics Guidelines for Trustworthy AI' (European Commission 2019) 11.
[526] ibid 12.
[527] ibid 14.
[528] Lorand Laskai and Graham Webster, 'Translation: Chinese Expert Group Offers "Governance Principles" for "Responsible AI"' (*New America*, 17 June 2019) <http://newamerica.org/cybersecurity-initiative/digichina/blog/translation-chinese-expert-group-offers-governance-principles-responsible-ai/> accessed 17 August 2020.
[529] ibid.

the highest standards of ethical business and good governance".[530] Like the principles elaborated by the OECD Membership, Australia's AI Ethics Principles refer to human, societal and environmental well-being, human-centred values, fairness, reliability and safety, transparency and explainability and accountability, expanding further on matters related to protection and security and opportunity for contestability of unfavourable outcomes of automated-decision making.[531]

Differences exists on the scope of application of the AI ethical principles. For example, while some governments have intended for their AI ethical principles to apply horizontally across all sectors of the economy, others have narrowed the scope of applicability of such principles to specific economic sectors, geographic locations, or relevant authority. For instance, in November 2018 the Monetary Authority of Singapore released a set of four principles (i.e. fairness, ethics, accountability and transparency) aimed at financial services providers for the use of artificial intelligence and data analytics in decision-making.[532] In early 2019 the local government of Dubai published a set of AI principles with applicability limited to the city's territory, covering ethics (i.e. fairness, transparency, accountability and understandability of AI systems), security, humanity (i.e. AI systems should align with human values), and inclusiveness.[533] Canada, on the other hand, has issued a set of guiding principles to ensure the effective and ethical use of AI by the governmental authority, covering transparency, explainability, openness (on source code, training data and other relevant information), measurability of impact of AI use and AI training.[534] Similarly,

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[530] Australian Government, 'AI Ethics Principles' (*Department of Industry, Science, Energy and Resources*, 2019) <https://www.industry.gov.au/data-and-publications/building-australias-artificial-intelligence-capability/ai-ethics-framework/ai-ethics-principles> accessed 19 March 2021.

[531] For instance, Australia's Principle 7 on 'contestability refers the need for AI actors to ensure that there is a timely process in place for people to contest the outcome of an AI system, when automated-decision making systems can significantly impact a person, group, community or environment. It builds on OECD AI Principle 1.3 on transparency and explainability, which calls for AI actors to provide meaningful information on AI systems to enable o enable those adversely affected by an AI system to challenge its outcome. ibid; Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.

[532] Monetary Authority of Singapore, 'Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector' (2018).

[533] Smart Dubai, 'AI Ethics Principles & Guidelines' (2019).

[534] Government of Canada, 'Responsible Use of Artificial Intelligence (AI)' (*Canada.ca*, 22 November 2018) <https://www.canada.ca/en/government/system/digital-government/digital-government-innovations/responsible-use-ai.html#toc1> accessed 22 March 2021.

in early 2020, pursuant to E.O. 13859 on 'Maintaining American Leadership in Artificial Intelligence', the White House published a draft Guidance for Regulation of Artificial Intelligence Applications for the specific and exclusive use of US Federal Agencies. It specified that, when formulating regulatory and non-regulatory approaches to private sector use of AI technology, US Federal agencies should take into consideration ten principles – public trust in AI, public participation, scientific integrity and information quality, risk assessment and management, benefits and costs, flexibility, fairness and non-discrimination, disclosure and transparency, safety and security, and interagency coordination.[535]

International organisations and national governments were not alone in establishing principles for the development of ethical and trustworthy AI, as significant efforts emerged also from the business sector, the civil society and multistakeholder initiatives. Evidence suggests that, together with national governments, private companies have been at the forefront of the campaign for the design of ethical principles or guidelines for AI.[536] Several high-tech firms in China, US, Latin America and Europe have issued documents containing principles regulating how they should approach the development of artificial intelligence and its applications, mainly covering issues like fairness, reliability and safety, controllability, privacy, inclusiveness, transparency and accountability.[537] These are examples of self-regulation.

Civil society entities like the UNI Global Union, an international federation for trade unions for the services sector, and The Public Voice, a global coalition promoting public participation in decisions concerning the future of the Internet, have also issued

[535] Lee Tiedrich, 'AI Update: White House Issues 10 Principles for Artificial Intelligence Regulation' (*Inside Tech Media*, 14 January 2020) <https://www.insidetechmedia.com/2020/01/14/ai-update-white-house-issues-10-principles-for-artificial-intelligence-regulation/> accessed 27 November 2020; Executive Office of the President, 'Guidance for Regulation of Artificial Intelligence Applications (Memorandum for the Heads of Executive Departments and Agencies), 17 November 2020'.
[536] Jobin, Ienca and Vayena (n 508) 391.
[537] 'Responsible AI Principles from Microsoft' (n 480); Google (n 479); Telefónica, 'AI Principles | Our Commitments | Responsible Business | Telefónica' (October 2018) <https://www.telefonica.com/en/web/responsible-business/our-commitments/ai-principles> accessed 22 March 2021; Deutsche Telekom, 'Guidelines for Artificial Intelligence' (2018) <https://www.telekom.com/en/company/digital-responsibility/details/artificial-intelligence-ai-guideline-524366> accessed 22 March 2021; Wenjun Wu, Tiejun Huang and Ke Gong, 'Ethical Principles and Governance Technology Development of AI in China' (2020) 6 Engineering 302, 306.

principles and guidelines for artificial intelligence, including references to issues that are outside the scope of this research (e.g., ban on AI arms race[538] and prohibition of unitary scoring[539]). Multistakeholder initiatives for the development of AI principles started as early as 2016, with the eight Tenets of the 'Partnership on AI'[540], followed by the Asilomar AI Principles of the Future of Life Institute in 2017[541], up until recent efforts in China by the Beijing Academy of Artificial Intelligence[542] and the Artificial Intelligence Industry Alliance (AIIA)[543].

4.4.1.1 From voluntary principles to binding measures

Ethical principles for artificial intelligence developed by State and non-state actors are a form of soft law that typically refers to voluntary and non-binding rules that are not legally enforceable.[544] This means that violations of or lack of conformity with those principles does not have legal effect. However, they may be subject to political, social, or cultural censorship.

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[538] UNI Global Union, '10 Principles for Ethical AI' (UNI Global Union 2017) 9.

[539] The Public Voice, 'Universal Guidelines for Artificial Intelligence' (*The Public Voice*, 23 October 2018) <https://thepublicvoice.org/ai-universal-guidelines/> accessed 22 March 2021.

[540] Partnership on AI, 'Tenets' (*Partnership on AI*, 2016) <https://www.partnershiponai.org/tenets/> accessed 22 March 2021.

[541] Future of Life Institute, 'Asilomar AI Principles' (*Future of Life Institute*, 2017) <https://futureoflife.org/ai-principles/> accessed 22 March 2021.

[542] Released in May 2019 by a multistakeholder coalition including the Beijing Academy of Artificial Intelligence (BAAI), Peking University, Tsinghua University, Institute of Automation and Institute of Computing Technology in Chinese Academy of Sciences, and an AI industrial league involving firms like Baidu, Alibaba and Tencent, the 15 'Beijing Principles' are proposed as an 'initiative for the research, development, use, governance and long-term planning of the healthy development of AI that can be beneficial to mankind. Future of Life Institute, 'AI Policy - China' (*Future of Life Institute*, February 2020) <https://futureoflife.org/ai-policy-china/> accessed 17 August 2020; Beijing Academy of Artificial Intelligence, 'Beijing AI Principles' (*Beijing Academy of Artificial Intelligence (BAAI)*, 28 May 2019) <www.baai.ac.cn/news/beijing-ai-principles-en.html> accessed 17 August 2020.

[543] Launched in 2017, AIIA includes leading tech companies Baidu, Alibaba, Tencent, Huawei, ZTE, as well as academic institutions like Tsinghua University, Zhejiang University, and the Harbin Institute of Technology among its members. In 2019 AIIA released a draft "joint pledge" on self-discipline in the AI industry that contains, among others, principles on safety and security, controllability, transparency and explainability, privacy, accountability, diversity, and inclusivity. Graham Webster, 'Chinese AI Alliance Drafts Self-Discipline "Joint Pledge"' (*New America*, 17 June 2019) <www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-chinese-ai-alliance-drafts-self-discipline-joint-pledge/> accessed 17 August 2020.

[544] John Villasenor, 'Soft Law as a Complement to AI Regulation' (*Brookings*, 31 July 2020) <https://www.brookings.edu/research/soft-law-as-a-complement-to-ai-regulation/> accessed 2 December 2021.

Why do non-state actors adopt voluntary ethical principles and guidelines related to artificial intelligence? This could be partially ascribable to the fact that, since technological progress happens at a faster pace than legal evolution, law tends to play catch-up with technological innovation. Companies and other non-state actors may feel the need to fill this void in regulation by directly addressing the risks associated with the use and development of AI through self-regulation. On the other hand, the adoption of voluntary AI ethical principles by non-state actors like private firms may be used to influence the need or desire for government regulation, including in international agreements. Indeed, some scholars suggest that the adoption of AI ethical principles and frameworks should be viewed as an attempt of the private sector to avoid stringent regulation by governments.[545] As a matter of fact, high-tech companies, especially US multinationals, tend to be wary of governmental intervention, arguing that excessive regulation could stifle innovation, although others counter that setting clear rules is likely to produce more ethical innovation in AI.[546]

Yet, the significance of these ethical principles from a legal perspective should not be underestimated. As a matter of fact, some of them can form the basis for the design and development of hard law, and can guide policy action from governments, who have the ability to make these principles binding by incorporating them into national and international legislation. Indeed, as Mishra points out, these principles can inform binding domestic laws and regulations in certain jurisdictions[547], with governments taking these non-binding, voluntary principles as policy references for the development of mandatory, hard law measures (e.g., regulations, decisions) that could have significant implications for trade in AI-powered services.

There already exist examples of domestic regulation that is driven by some of this AI ethical principles adopted by governments. Case in point is the US Algorithmic

[545] Ben Wagner, 'Ethics as an Escape from Regulation: From Ethics-Washing to Ethics-Shopping?' in Emre Bayamlioglu and others (eds), *Being Profiled: Cogitas Ergo Sum: 10 Years of Profiling the European Citizen* (Amsterdam University Press 2018) 3–4.
[546] Sebastian Klovig Skelton, 'Digital Ethics Summit: Innovation Needs Regulation to Be Ethical' (*ComputerWeekly.com*, 15 December 2021) <https://www.computerweekly.com/news/252510992/Digital-Ethics-Summit-innovation-needs-regulation-to-be-ethical> accessed 29 December 2021.
[547] Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35) 7.

Accountability Act of 2019, a draft legislation that aims to address the 'black-box' issue in AI systems and increase transparency in automated decision-making. Recognising that high-risk automated decision systems may contribute to inaccuracy, bias, discrimination or facilitate decision-making about sensitive aspects of consumers lives by evaluating consumer behaviour, this bill requires commercial entities to conduct assessments of high-risk automated decision-making systems, with a view to increase algorithmic accountability.[548]

Likewise, several US cities and States have implemented bans or introduced regulation restricting the use of facial recognition services[549], on the grounds that their unconstrained use could threaten democratic values, and pose risks of discrimination, thus reflecting the ethical principles related to the respect of human rights and the principle of non-discrimination.[550] Notably, facial recognition services are currently supplied primarily by states or governmental authorities for law enforcement purposes, thus falling outside the scope of application on the GATS. However, it is possible that facial recognition services could also be available for commercial purposes. Therefore, binding measures restricting the use of these services could have an impact on trade in services if they were to be applied in a discriminatory manner against foreign services and service suppliers.

Also, in its White Paper on Artificial Intelligence the European Commission advocated the establishment of an AI regulatory framework based on the precautionary principle, meaning that AI regulation should concentrate on how to minimize the various risks of potential harm especially the most significant.[551] The policy options set out in the White Paper were later translated in a proposal for an AI regulation (the 2021 Artificial Intelligence Act) by the European Commission that contains a set of harmonised rules

[548] Algorithmic Accountability Act of 2019 2019 [Bill-H.R.2231-116th Congress (2019-2020)] s 3 (b).
[549] OECD AI Policy Observatory, 'Local, State and Federal Regulations on Facial Recognition Technologies - Policy Initiative' (2021) <https://www.oecd.ai/dashboards/policy-initiatives/2019-data-policyInitiatives-26890> accessed 1 April 2021.
[550] Facial Recognition - State and Local Government, Washington State.
[551] Recognizing that risks can stand from flaws in overall design of AI systems or the use of data without correcting possible bias, the EU is focused on developing a framework applicable to all economic operators that provide AI-enabled services (and products) in the EU, irrespective of their place of establishment. European Commission, 'EU White Paper on Artificial Intelligence' (n 69) 10.

aimed at supporting the development of secure, trustworthy and ethical AI and ensuring the protection of ethical principles.[552]

Evidence from China also suggests that governments can use ethical principles to develop further action on AI governance. Indeed, to refine and implement China's 'Governance Principles for the New Generation Artificial Intelligence', in September 2021 the National Governance Committee for the New Generation Artificial Intelligence published the 'Ethical Norms for the New Generation Artificial Intelligence'.[553] The Committee established that, in order to integrate ethics into the entire life cycle of AI, AI activities must abide to six fundamental ethical norms: (i) enhancing the well-being of humankind; (ii) promoting fairness and justice; (iii) protecting privacy and security; (iv) ensuring controllability and trustworthiness; (v) strengthening accountability; and (vi) improving ethical literacy.[554] It also put forward 18 ethical requirements for specific activities such as norms of management (i.e. promotion of agile governance, active practice, exercise and use power correctly, strengthen risk preventions, and promote inclusivity and openness), norms of R&D (i.e. strengthen the awareness of self-discipline, improve data quality, enhance safety, security and transparency, avoid bias and discrimination), norms of supply (i.e. respect market rules, strengthen quality control, protect the rights and interests of users, strengthen emergency protection), and norms of use (i.e. promote good use, avoid misuse and abuse, forbid malicious use, timely and proactive feedback, and improve the ability to use).[555] These norms apply to "natural persons, legal persons, and other related organizations engaged in related activities such as management, research and development, supply, and use of AI", although the Committee did not specify whether they apply to both domestic and foreign entities established in China.[556] Uncertainty also surrounds the enforcement of

[552] EU Artificial Intelligence Act 1–2.
[553] In the absence of an official translation in English, this research relies on an unofficial translation by the China-UK Research Centre for AI Ethics and Governance at the Institute of Automation, Chinese Academy of Sciences. Yi Zeng, 'The Ethical Norms for the New Generation Artificial Intelligence, China' (*China-UK Research Centre for AI Ethics and Governance*, 26 September 2021) <https://ai-ethics-and-governance.institute/2021/09/27/the-ethical-norms-for-the-new-generation-artificial-intelligence-china/> accessed 19 December 2021.
[554] ibid.
[555] ibid.
[556] ibid.

these ethical norms, with no indication of which entity or authority is responsible for ensuring their implementation.

4.4.2 AI standards

AI ethical principles are often translated into standards and technical regulations. The OECD recommends that governments "promote the development of multi-stakeholder, consensus-driven global technical standards for interoperable and trustworthy AI" based on its AI Principles.[557] Indeed, as the US Administration pointed out, "AI standards that articulate requirements, specifications, guidelines, or characteristics can help ensure that AI technologies and systems meet critical objectives for functionality, interoperability, and trustworthiness—and that they perform accurately, reliably, and safely".[558] Likewise, under its Global Initiative on Ethics of Autonomous and Intelligent Systems, IEEE suggested that standards, certification, regulation or legislation for design, manufacture, and use of autonomous and intelligent systems should be based on the set of principles and recommendations it identified in its 'Ethically Aligned Design' conceptual framework.[559] For example, in order to ensure that the basis of any decision by autonomous and intelligent systems is always discoverable, "new standards should describe measurable, testable levels of transparency, so that systems can be objectively assessed and levels of compliance determined".[560] The International Elecrotechnical Commission (IEC)[561] opined that standardization is expected to play an essential role in mitigating some of the most pressing challenges related to decision-making by machines, as well as in driving market adoption of artificial intelligence.[562]

[557] Recommendation 2.5. Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449.
[558] National Institute of Standards and Technology, 'A Plan for Federal Engagement in Developing AI Technical Standards and Related Tools - Prepared in Response to Executive Order 13859' (National Institute of Standards and Technology 2019) 8; US White House (n 417).
[559] IEEE, 'Ethically Aligned Design' (IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems 2017) 2.
[560] ibid 28.
[561] IEC is the world's leading organization for the preparation and publication of international standards for all electrical, electronic and related technologies. International Electrotechnical Commission, 'Who We Are' (*IEC*) <https://www.iec.ch/who-we-are> accessed 2 April 2021.
[562] IEC, 'Artificial Intelligence Across Industries - White Paper' (International Electrotechnical Commission 2018) 3.

Thus, technical standards could play a critical role in shaping the future of artificial intelligence.[563]

However, engaging with questions of ethics and responsible development, deployment and evaluation of AI is only one of the approaches used to develop AI-related standards.[564] Indeed, standards may also be used to identify foundational areas for ongoing technical definition and refinement, codify existing good practice(s), drawing on broader ICT-focused Standards, and clarify technical areas where AI is rapidly outpacing existing regulation.[565]

4.4.2.1 Developing national and international AI standards

International, regional, and national standardisation bodies (NSB) have recently started to take up standardization work in the field of artificial intelligence. For example, in 2017 the Joint Technical Committee 1 (JTC 1), a joint technical committee of the International Standard Organization (ISO)[566] and the International Electrotechnical Commission (IEC) dedicated to standardization work in the field of information technology[567], established Sub-Committee 42 (SC 42) to focus on standardisation on artificial intelligence, and provide guidance to ISO and IEC Committees developing AI applications.[568] As of November 2019, SC 42 had 29 Participating Members, including Australia, Canada, China, India, Japan, Singapore, South Korea, the United Kingdom (UK) and the US, and 12 Observing Members, encompassing Argentina, New Zealand, Philippines, and South Africa, among others. Current standards under development by SC 42 address AI concepts and terminology (ISO/IEC 22989), bias in AI systems and AI-aided decision-making (ISO/IEC 24027), governance implications of the use of

[563] ibid 13.
[564] Standards Australia, 'An Artificial Intelligence Standards Roadmap: Making Australia's Voice Heard' (Standards Australia 2020) 12.
[565] ibid 12, 26.
[566] ISO is an independent, non-governmental organization, with a membership of 165 national standards bodies, dedicated to developing voluntary, consensus-based, market relevant International Standards. International Standard Organization, 'About Us' (*ISO*) <https://www.iso.org/about-us.html> accessed 2 April 2021.
[567] ISO/IEC JTC 1, 'About' (*JTC 1*) <https://jtc1info.org/about/> accessed 2 April 2021.
[568] ISO/IEC JTC 1, 'ISO/IEC JTC 1/SC 42 - Artificial Intelligence' (*JTC 1*, November 2019) <https://jtc1info.org/sd-2-history/jtc1-subcommittees/sc-42/> accessed 2 April 2021.

artificial intelligence by organizations (ISO/IEC 38507), risk management (ISO/IEC 24372), and ethical and societal concerns (ISO/IEC 24368).[569] ISO and IEC also carry out standardization work in AI as separate entities. ISO focuses on AI standardisation research in the areas of smart finance, intelligence driving, and robotics, whereas IEC concentrates on wearable devices.[570]

The ITU is also developing international standards for artificial intelligence and its components.[571] Recent standards provide an architectural framework for machine learning in future networks (Y.3172), and frameworks for evaluating intelligence levels of future networks (Y.3173) and data handling to enable machine learning in future networks (Y.3174), and cover issues related to cloud computing and big data.[572]

Among the countries that are developing and imposing the respect of national standards and technical regulations on artificial intelligence (or are considering doing so) are China, the EU, and the United States. As Ding points out, under its AI strategy China is pushing for the development of national standards in AI-related industries that differ from international standards, in order to favour Chinese companies over foreign competitors in the domestic market.[573] Indeed, in its 2018 White Paper on Artificial Intelligence Standardization, the Standardization Administration of China (SAC) stated that standardization work plays fundamental, supportive, and guiding roles for AI and its industrial development, representing a key lever for innovation and for promoting industry competition.[574] More specifically, recognizing that, on a global scale, standardization work is still in its infancy and that there is an opportunity for China to

[569] ibid.
[570] Standardisation Administration of China, 'Artificial Intelligence Standardization White Paper' (Translation by Center for Security and Emerging Technology (CSET) 2018) 38 <https://cset.georgetown.edu/research/artificial-intelligence-standardization-white-paper/> accessed 2 April 2021.
[571] The United Nations specialized agency for information and communication technologies, ITU is tasked with facilitating international connectivity in communication networks and developing technical standards to sure the seamless interconnection of networks and technologies. ITU, 'About International Telecommunication Union (ITU)' (*ITU*) <https://www.itu.int:443/en/about/Pages/default.aspx> accessed 2 April 2021.
[572] 'ITU-T Recommendations' (*ITU*) <https://www.itu.int/itu-t/recommendations/index.aspx?ser=Y> accessed 2 April 2021.
[573] Jeffrey Ding, 'Deciphering China's AI Dream' (Future of Humanity Institute, University of Oxford 2018) 4, 17–21.
[574] Standardisation Administration of China (n 570) 2.

take the lead in AI standards innovation, SAC pushes for the development of standards for various AI fields and for using use them as a means to promote the booming development of AI technologies and industry in China.[575]

The EU is also gearing up to include standards in its approach to AI governance. In its 2020 White Paper on Artificial Intelligence, the EU Commission indicated that the future regulatory framework for AI will include mandatory legal requirements for high-risk AI applications that are likely to be further specified through standards.[576] To address ethical issues related to safety, privacy, non-discrimination, and respect of fundamental rights, it is expected that the EU will establish mandatory requirements – and their relevant standards – on training data, data and record-keeping, information to be provided, robustness and accuracy, human oversight, and remote biometric identification.[577]

Prompted by the launch of AI national strategies by key trading partners such as China and the EU, the US government has also embarked on the development of AI standards.[578] Under the American AI Initiative[579], in response to E.O. 13859, which required the Secretary of Commerce to design a plan for the US federal government to engage in the development of technical standards to support trustworthy artificial intelligence[580], the US National Institute of Standards and Technology (NIST)[581] published a roadmap for prioritizing Federal Agencies engagement in the development of AI standards.[582] NIST recommended the Federal Government to strategically increase participation in the development of technical AI standards, engaging with international parties to advance AI standards for "US economic and security needs'", including by championing "US AI standard priorities in AI standard development

[575] ibid.
[576] European Commission, 'EU White Paper on Artificial Intelligence' (n 69) 18.
[577] ibid.
[578] Standards Australia (n 564) 19.
[579] US White House (n 417).
[580] E.O. 13859 s 6(d).
[581] NIST is the leader in advancing foundational research in measuring and assessing AI technologies, including the development of AI data standards and best practices, as well as AI evaluation methodologies and standard testing protocols. US White House (n 417).
[582] National Institute of Standards and Technology (n 558).

activities around the world", and partnering with like-minded countries to develop AI standards that reflect Federal priorities for innovation, public trust, and confidence.[583] Industry responded emphasising the importance of the standards being developed by ISO/IEC JTC 1/SC 42.[584]

This approach was reflected in the National Artificial Intelligence Initiative Act (NAIIA), a bill proposed in March 2020 that did not receive a vote, which stated that the US government would support the development of voluntary standards, best practices, and benchmarks for the development and use of trustworthy artificial intelligence systems, including opportunities for international cooperation with strategic allies and called for the establishment of a voluntary risk management framework for the trustworthiness of AI systems that shall include, among others, the alignment with voluntary consensus standards, including international standards, to the fullest extent possible.[585] According to the NAIIA, standards for trustworthy AI systems include standards for privacy and security (including for datasets used to train or test artificial intelligence systems and software and hardware used in artificial intelligence systems), safety and robustness of AI systems, and auditing mechanisms and benchmarks for accuracy, transparency, verifiability, and safety assurance for AI systems.[586]

The importance of developing standards for artificial intelligence was acknowledged once more in the Memorandum for the Heads of Executive Departments and Agencies issued by the White House in November 2020 to provide policy guidance for the development of regulatory and non-regulatory approaches to sectors empowered or enabled by artificial intelligence, which should follow the AI principles outlined in E.O. 13859.[587] According to the Memorandum, whenever existing regulations are sufficient or the benefits of a new regulation do not justify its costs, Federal Agencies should give preference to non-regulatory approaches, such as voluntary consensus standards,

[583] ibid 5–6; US White House (n 417).
[584] Standards Australia (n 564) 19.
[585] Text - H.R.6216 - 116th Congress (2019-2020) s 101(b), and 301(b).
[586] ibid 301(a)(1).
[587] Executive Office of the President (n 535) 1.

but may engage with standard-setting organizations to identify practical standards for use in regulation.[588]

Besides China, the EU and the United States, other countries have expressed an interest in developing AI-specific standards both at national and international level that could have potential implications for trade in services. For example, the South Korean government expects to prepare ethical standards to prevent AI systems from infringing privacy and personal information, and establish minimum protection measures imposing 'safety-by-design' (e.g. kill switch) to securing safety and reliability of AI-based technologies and services.[589] In Australia, the national standardisation body – Standards Australia - published an AI Standards Roadmap arguing in favour of increasing the influence of the Australian Government in AI standards development globally, and in establishing best practices in the design, deployment and evaluation of AI systems, for example by supporting the development of 'safety-by-design' and 'security-by-design' standards.[590]

Overall, it appears that national standards are emerging primarily in the field of autonomous vehicles, robotics, and data protection. While data-related standards may be relevant from a GATS perspective, AI standards for robots and self-driving cars are most likely to fall under the purview of the TBT Agreement.[591] The latter falls outside the scope of analysis of this study.

[588] ibid 7–8, and 10.
[589] The Government of South Korea (n 438) 26.
[590] According to Standards Australia, safety refers to attacks against the infrastructure of a product or service and security refers to targeted abuse against individuals within the product or service. Thus, developing standards to further enhance security in the maturing AI industry by imposing the development of AI systems with security built-in 'by design' is necessary to maintain information security, privacy and safety and ensure the security and resilience of Australia's systems and networks. Standards Australia (n 564) 4–5, and 34.
[591] Aik Hoe Lim, 'Trade Rules for Industry 4.0' in Ching-Fu Lin, Shin-yi Peng and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law: Disruption, Regulation, and Reconfiguration* (Cambridge University Press 2021); Shin-yi Peng, 'Autonomous Vehicle Standards under the Technical Barriers to Trade Agreement' in Ching-Fu Lin, Shin-yi Peng and Thomas Streinz (eds), *Artificial Intelligence and International Economic Law: Disruption, Regulation, and Reconfiguration* (Cambridge University Press 2021).

4.4.2.2 Impact of AI standards on digital trade

The emergence of new AI standards or associated technical regulations may have a significant impact on the growth and structure of digital trade. With up to 80 % of global trade (USD $4 trillion annually) being affected by standards and technical regulations[592], the creation and use of global standards that secure and facilitate the interoperability of goods and services allow to minimize unnecessary restrictions to trade.[593]

However, the design and implementation of national standards that encompass additional mandatory requirements which go beyond internationally agreed ones could constitute a potential barrier to trade.[594] First of all, standards and technical regulations in artificial intelligence can be used as a source of unfair comparative advantage or disadvantage.[595] For example, governments may adopt standards that raise compliance costs for foreign competitors in order to favour national champions.[596] Indeed, since standardization in the field of artificial intelligence is still in its preliminary stages, governments may have an incentive to influence the development of standards – both at national and international level – that can advantage their domestic firms to the detriment of foreign competitors, as evidenced by the Australian and Chinese approaches.[597]

Secondly, the proliferation of national AI standards is likely to increase regulatory compliance costs for AI companies that operate across multiple jurisdictions where different standards apply.[598] This lack of harmonization is likely to make it too burdensome for some AI service suppliers, especially of smaller size, to access foreign markets, resulting in a *de facto* barrier to trade. As Mavroidis points out, as economies

[592] Standards Australia (n 564) 9.
[593] Ferracane, Lee-Makiyama and van der Marel (n 42) 67.
[594] ibid.
[595] Goldfarb and Trefler (n 38) 487.
[596] ibid.
[597] Standards Australia (n 564); Konrad-Adenauer-Stiftung (KAS), 'KAS-Strathclyde Interview Series on AI, Global Governance & Ethics: Interview with Dr Joshua Meltzer' (*www.kas.de*, 10 December 2020) <https://www.kas.de/en/interview/detail/-/content/kas-strathclyde-interview-series-on-ai-global-governance-ethics-interview-with-dr-joshua-meltzer> accessed 15 December 2020.
[598] Goldfarb and Trefler (n 38) 487.

become increasingly servicified, services standards multiply, and by involving investments in technologies, payments of royalties, and conformity assessments, standards rise rivals' costs.[599]

But the proliferation of AI standards at domestic level could also lead to forms of trade diversion. For example, as suggested by the European Group on Ethics in Science and New Technologies, the uncoordinated, unbalanced approaches in the regulation of AI and 'autonomous' technologies may lead to 'ethics shopping', resulting in the relocation of AI development and use to regions with lower ethical standards.[600] On the other hand, AI national standards could also be used as a form of strategic economic influence. Case in point is China that, some trade experts suggest, could use of the One Belt, One Road and Digital Silk Road initiatives to export its AI standards to countries in Africa and Asia, splitting the world between Chinese-oriented regional standards and Western standards.[601]

4.4.3 Subsidies

While ethical principles and standards tend to be used primarily to mitigate the risks associated with the ever-increasing use of artificial intelligence, governments have also directed specific actions at fostering and supporting innovation in artificial intelligence. In order to achieve this objective, several governments have signalled their intention to employ subsidies to support enterprises operating in the AI field, including services suppliers, as well as other policies to increase capabilities in AI research and development, including schemes to nurture AI talent and funding provided to universities, research institutes and other public entities.

Existing literature found that subsidy practices affecting trade in services include financial contributions, such as grants and other domestic payments, concessional

[599] Petros C Mavroidis, *The Regulation of International Trade. Volume 3: The GATS:, General Agreement on Trade in Services* (The MIT Press 2020) 287.
[600] European Group on Ethics in Science and New Technologies, 'Statement on Artificial Intelligence, Robotics and "Autonomous" Systems' (European Commission 2018) Website 14 <http://op.europa.eu/en/publication-detail/-/publication/dfebe62e-4ce9-11e8-be1d-01aa75ed71a1/language-en> accessed 9 April 2021.
[601] Konrad-Adenauer-Stiftung (KAS) (n 597).

financing, and tax concessions, as well as in-kind support, which covers benefits provided in forms other than money such as services to help exporters or specific infrastructure.[602] Although financial assistance appears as a recurring form of governmental support among countries that are interested in promoting AI innovation, the concession of privileged access to government data could be considered a form of indirect in-kind subsidy.[603] Similarly, the governmental provision of preferential access to computing resources (e.g. supercomputing and high performance computing facilities) to the private sector could be regarded as a form of in-kind subsidy.

According to the OECD AI Policy Observatory, the second largest group of AI policy initiatives adopted by the countries and territories under its consideration concern direct financial support to public and private entities, including loans and credits for innovation in firms, equity financing, innovation vouchers[604], corporate tax relief for R&D, and grants for business R&D and innovation.[605]

As of 2020, China is among the countries making the most extensive use of government-led subsidies to advance its AI agenda, although the lack of comprehensive data makes it challenging to estimate the country's actual amount of expenditure in this area.[606] The 2017 Three-Year Next Generation of Artificial Intelligence Development Plan explicitly calls for supporting AI development through the implementation of tax incentives for SMEs and start-ups, other tax incentives, R&D cost deductions, and other policies.[607] Among the instruments used by the Chinese government to achieve this goal are 'government guiding funds' (GGFs), which make equity investments in companies in government-prioritised industries after raising

[602] Ronald Steenblik, 'A Subsidy Primer - Global Subsidies Initiative' (International Institute for Sustainable Development 2007) 21, 36.
[603] Goldfarb and Trefler (n 38) 486.
[604] The OECD defines innovation vouchers as "small grants allocated to SMEs to purchase services from external knowledge providers […] employed to fund business advisory and technology extension services, among others. OECD AI Policy Observatory, 'National AI Policies & Strategies' (*OECD AI Policy Observatory*, 2021) <https://oecd.ai/dashboards?selectedTab=policyInstruments> accessed 13 April 2021.
[605] ibid.
[606] Thomas J Colvin and others, 'A Brief Examination of Chinese Government Expenditures on Artificial Intelligence R&D' (IDA Science & Technology Policy Institute 2020) v.
[607] State Council of the People's Republic of China (n 281) 25.

capital from government entities and other co-investors.[608] Local governments tend to use the GGF mechanism in larger measure than the central government, with investments up to USD 1 billion on domestic start-ups, mainly in the areas of healthcare and AI in 2018.[609]

Other countries have signalled their intention to provide financial assistance to the private sector to foster AI innovation, either specifying the types of instruments they plan on adopting to pursue their objective or manifesting a general intention to increase funding in key aspects of AI, such as data and computing resources. For example, the South Korean government declared its intention to support AI start-ups though the establishment of a 'future technology development fund', the provision of preferential treatment to guarantee technology and the reduction of guarantees fees for innovative AI technology holders, the identification and nurturing of outstanding AI start-ups using start-up platforms, and the securing of infrastructure to promote AI start-ups, for example by expanding the voucher program supporting commercialization funds for perspective AI business founders, in order to establish a 'global living AI ecosystem'.[610] Moreover, in presenting the Presidential Initiative for Artificial Intelligence, President Moon Jae-in declared that the South Korean government intended to "make preemptive investments in such sectors such as next generation AI chips so as to secure a leading position in the global market and […] expand its support for the high-capacity cloud computing needed for the development of AI for businesses, universities and research institutions".[611]

The Serbian government is also planning on using innovation vouchers to financially incentivise SME to collaborate with R&D institutions to increase their competitiveness

[608] Colvin and others (n 606) 25.
[609] According to Ding, GGF serve a double purpose, "helping speed up AI development while also incorporating tech companies within the party apparatus". Ding (n 280) 21; Colvin and others (n 606) 26.
[610] The Government of South Korea (n 438) 28.
[611] The Government of South Korea (n 438).

in the AI field, and provide financial assistance to enterprises through the Matching Grant Program to support the commercialization of their R&D.[612]

The United States are equally invested in promoting AI innovation. The former US Administration indicated its intention to double R&D spending in non-defence artificial intelligence by 2022, and to leverage existing Federal investments to advance objectives under the National Artificial Intelligence Initiative, for example through grants, cooperative agreements, testbeds, and access to data and computing resources.[613] It is possible that, in the context of the American AI Initiative, the US government envisaged allocating part of these funds to offer financial assistance to domestic companies operating in the AI field, including in the services sector, to provide an advantage over foreign competitors in order to maintain US leadership in AI. Moreover, under the American AI Initiative, the United States also signalled their intention to indirectly subsidize the domestic AI industry by providing (privileged) access to Federal data and computing resources (e.g. high-powered computing infrastructure in national laboratories) to carry out AI R&D.[614] The argument that providing privileged access to governmental databases, especially in sectors like healthcare or finance, to domestic companies that specialise in AI or supply AI-powered services is a form of subsidy stems from the acknowledgement that data is a key aspect of artificial intelligence. The higher the quality and the larger the amount of data available to AI and developers to train AI algorithms, the better the AI model can be. And, as a result, the better the quality of the service powered by said algorithms. Therefore, if domestic companies are granted privileged access to

[612] Government of the Republic of Serbia, 'Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the Period 2020-2025' (*OECD AI Policy Observatory*, 2020) <https://www.oecd.ai/dashboards/policy-initiatives/2019-data-policyInitiatives-26466> accessed 13 April 2021; Government of the Republic of Serbia, 'Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the Period 2020-2025' (2020) 34.

[613] Office of Science and Technology Policy, 'President Trump's FY 2021 Budget Commits to Double Investments in Key Industries of the Future' (*White House*, 11 February 2020) <https://trumpwhitehouse.archives.gov/briefings-statements/president-trumps-fy-2021-budget-commits-double-investments-key-industries-future/#:~:text=The%20President%27s%20Budget%20prioritizes%20the,QIS%20as%20Administration%20R%26D%20priorities.> accessed 9 April 2021; Text - H.R.6216 - 116th Congress (2019-2020) s 101(b).

[614] US White House (n 417); Text - H.R.6216 - 116th Congress (2019-2020) s 501.

government data, it gives them a comparative advantage over foreign companies that do not have access to those data. Article 1 of the Agreement on Subsidies and Countervailing Measures (SCM) lists four types of financial contributions granted by a government that can qualify as subsidy if they confer a benefit, including the provision of goods or services other than general infrastructure, or the purchase of goods. While preferential access to databases could be considered akin to a provision of goods or services, the absence of any reference to data could raise question as to whether this form of assistance falls outside the common definition of subsidies. However, since the SCM applies only to trade in goods, and the GATS offers no definition of services subsidy, preferential access to governmental databases to AI companies operating in the services field could be considered a subsidy.

If discriminating between domestic and foreign companies and conferring a benefit to the former to the detriment of the latter, AI-specific subsidies may result in violation of WTO trade rules, as discussed more in detail in Section 5.3.2.3 on services subsidies. Unsurprisingly the countries that can afford to engage in a war of subsidies are the United States, China, and other developed economies with large pockets and a keen interest in taking the lead in the development of artificial intelligence.

4.5 Emerging Approaches to AI Regulation

There are three main approaches to AI regulation that emerge from the analysis of AI policies introduced in the period 2015-2021 across different economies. At the one end of the spectrum lies the so-called 'laissez-faire approach', which refers to the absence of AI-specific regulation or the implementation of narrow regulatory intervention by governments. Under this approach governments tend to refrain from intruding into the operation of the private sector through the adoption of specific regulation dedicated to artificial intelligence, leaving it primarily to companies to develop their own AI ethical guidelines and voluntary standards through self-regulation. Some commentators point to the US as an example of laissez-faire (or free market) approach to AI policy, drawing similarities with its approach to privacy.[615] Indeed, as evidenced by the 2020 draft

[615] Konrad-Adenauer-Stiftung (KAS) (n 597); Standards Australia (n 564) 19.

'Guidance for Regulation of Artificial Intelligence Applications', which calls for federal agencies to "avoid regulatory or non-regulatory actions that needlessly hamper AI innovation and growth" and to "avoid a precautionary approach that holds AI systems to such an impossibly high standard that society cannot enjoy their benefits", the US government is concerned with avoiding unnecessary regulation and appears to favour non-regulatory approaches (e.g. sector-specific policy guidance or frameworks, Voluntary Consensus Standards, and pilot programs) to address the risks posed by certain AI applications.[616]

At the opposite end of the spectrum lies the second approach, which focuses on the adoption of hard law, binding AI regulation. The 2021 draft proposal for a risk assessment-based regulation on artificial intelligence by the European Commission best exemplifies it.[617] Notably, other governments have signalled their intention to follow the EU risk-based approach, as shown by the passing of a bill to create a legal framework for AI in Brazil, though it is less comprehensive than the EU regulation.[618] Detractors of the EU approach to AI governance warn that stringent regulation could stifle AI innovation and argue in favour of adopting hard law only for high-risks technologies that demonstrably harm consumers. This second approach, which implies a direct involvement of the government in the establishment of AI governance frameworks and for the technology to be heavily regulated, is the most likely to come under the purview of international trade law, as binding AI-specific measures adopted by WTO Members, if unnecessarily trade-restrictive and discriminatory, may come into conflict with said Members' obligations and commitments under multilateral and preferential trade agreements.

The third type of approach, which sits somehow in the middle between the previous two, is based on the idea of regulatory sandboxes. Used primarily in the context of

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[616] Executive Office of the President (n 535).
[617] EU Artificial Intelligence Act.
[618] Melissa Heikkilä, 'AI: Decoded from Politico' (*POLITICO*, 17 November 2021) <https://www.politico.eu/newsletter/ai-decoded/brazils-ai-law-us-takes-a-risk-based-approach-social-scoring/> accessed 21 December 2021; Eduardo Piovesan, 'Câmara aprova projeto que regulamenta uso da inteligência artificial' (*Portal da Câmara dos Deputados*, 29 September 2021) <https://www.camara.leg.br/noticias/811702-camara-aprova-projeto-que-regulamenta-uso-da-inteligencia-artificial/> accessed 21 December 2021.

financial services and computer science, a regulatory sandbox refers to a regulatory 'safe space' for experimentation involving the application of technologies.[619] It allows businesses to "conduct limited tests of their innovations with fewer regulatory constraints, real customers, less risk of enforcement action, and ongoing guidance from regulators".[620] As indicated by the South Korean government, a major proponent of this approach to AI governance, by adopting a strategy of 'approval first and regulate later' on new industries and new technologies, the government aspires to create a regulatory system that enables the creation of new services and accelerates the spread of innovation by pushing the revision of law subject to regulated sandbox cases.[621] This approach can be particularly useful if applied to specific sectors or areas, as evidenced by the widespread use of regulatory sandboxes in fintech.

4.6 Concluding Remarks

AI governance has undergone a significant transformation since the founding of the WTO. While the period between 1995 and 2015 was characterised primarily by AI-related policies, with a focus on data, since the mid-2010s governments have started to design and adopt a few policies that target AI explicitly and exclusively. The emergence of these AI-specific policies suggests that policymakers have come to understand that this technology's unique features require them to undertake a novel and distinct policy approach that singles out AI from other digital technologies, and addresses issues that pertain exclusively to AI systems and applications.

So far, governments have introduced AI-specific policies for two main reasons. On the one hand, they aim at building AI capacity to take advantage of the benefits deriving from AI innovation and deployment. For some countries the ultimate goal is positioning themselves as leaders in the AI race, either worldwide (e.g., China and the US) or for a sub-set of economies (e.g., India). For others building AI capacity is viewed as necessary to reduce dependence on foreign AI products and services and close the

[619] Dirk A Zetzsche and others, 'Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation' (2017) 23 Fordham Journal of Corporate and Financial Law 31, 45.
[620] Hilary J Allen, 'Regulatory Sandboxes' (2019) 87 George Washington Law Review 579, 580.
[621] The Government of South Korea (n 438) 24.

digital divide. On the other hand, governments aim at mitigating the risks associated with the use of AI (e.g., opacity, bias, discrimination, breach of privacy, errors), with the EU playing a primary role in proposing the first risk-based AI regulation of its kind.

There are three main types of AI-specific policies that warrant particular attention from an international trade law perspective: ethical principles, standards, and subsidies. Applicable to both goods and services and potentially trade-restrictive, they can cover some of the AI key components that AI-related policies also address, namely data, algorithms, and computing power. Although some governments have indicated that the AI-specific policies complement other measures relevant to AI[622], further research is needed to understand the extent to which the former integrate or overlap with the latter.

Except for economies like China, whose multi-year economic plans lay out binding targets for governmental rule-making, or the EU, who proposes to adopt hard-law legislation on AI, most countries are still in the early stages of development of AI governance frameworks. The bulk of these instruments are still in the form of soft law, tend to be adopted on a voluntary basis, and have yet to be fully translated into binding pieces of legislation. However, they are still significant because they provide an overview of what the future may hold with respect to the type of measures governments may implement to achieve their AI-related goals, and their potential impact on international trade.

Three approaches to AI regulation emerge in this relatively new area of action for governments: the laissez-faire approach, the hard law approach, and the regulatory sandbox approach. Yet, AI governance should not be considered the exclusive domain of governments. Multiple actors, including non-state actors such as companies and the civil society, have started to get involved in the design of AI ethical principles and standards.

[622] For example, the European Commission clarified that its 2021 proposal for an AI regulation complements the GDPR as well as existing EU law on non-discrimination. EU Artificial Intelligence Act 4.

PART III - Understanding the Issue: What is the Relationship Between Trade Rules and AI Governance?

5 Chapter - Artificial Intelligence and Applicability of GATS Rules

5.1 Introduction

Understanding the relationship between international trade law and efforts to regulate, directly or indirectly, artificial intelligence requires an analysis of the applicability of WTO agreements to those AI-related and emerging AI-specific measures adopted by governments that may act as barriers to trade. Existing literature has partly addressed this issue through debates on some areas that, although of concern to all digital technologies, are relevant to AI: (i) digital products classification; (ii) cross-border data flows; and (iii) digital trade regulation. For example, with regards to the classification of digital products under the WTO goods and services dichotomy framework, most scholars agree on the relevance of the GATS for most digital services, although differences emerge on the extent potential 'new' services are covered under the agreement.[623] For example, Willemyns argues that the GATS covers any service in any sector, regardless of the means of delivery and that, therefore, it is possible to question the what extent measures that considerably limit free trade in digital services are consistent with the GATS.[624] Weber, on the other hand, argues that, due to the positive list approach of the GATS, new services are not automatically covered by the agreement, and that the existing GATS classification system is quite outdated resulting in a lack of clarity as to the covered services.[625] Thus, based on existing literature, it is debatable whether AI-powered services can be classified within the existing GATS framework, and thus trigger the application of GATS obligations to measures affecting the supply of these type of services.[626]

[623] Willemyns (n 25); Fleuter (n 25); Rolf H Weber and Mira Burri, *Classification of Services in the Digital Economy* (Springer 2013); Neeraj (n 276); Weber (n 276).
[624] Willemyns (n 25) 63, 83.
[625] Weber (n 276) 9.
[626] Willemyns (n 25) 60, 80.

Debates on the treatment of cross-border data flows under WTO law also offered useful insight on the applicability of international trade law to AI-related measures, since they focused on trade restrictions imposed on data, a key component of all technologies underpinning the digital economy, including AI. More specifically, an overview of scholarly work on data seems to indicate that, notwithstanding the fact that several WTO agreements address matters relevant to digital trade, the GATS is considered the most relevant for data-driven services.[627] Some scholars, in particular, point to Article 5(c) of the Annex on Telecommunications as evidence that the GATS contains disciplines on cross-border data flows for service suppliers from non-telecommunication services.[628] Others refer to the Understanding on Commitments in Financial Services, which establishes that Members are prohibited from taking measures that prevent transfers of information or the processing of financial information, including transfers of data by electronic means, where such transfers of information, or processing of financial information are necessary for the conduct of the ordinary business of a financial service supplier.[629] Also, several studies found that AI-related measures, such as data localisation requirements, could violate certain GATS obligations and commitments.[630] However, although governments could invoke the general or national security exceptions to justify potential GATS inconsistencies, some scholars suggest that the conditions for provisional justification and the requirements of the chapeau of Article XIV, as well as the legal standard of review for Article XIV *bis* could make it difficult for some of these measures to qualify as exceptions under the

[627] Aaronson and Leblond (n 24) 251; Aaronson, 'Data Is Different: Why the World Needs a New Approach to Governing Cross-Border Data Flows' (n 334) 8.
[628] Article 5 (c) of the GATS Annex on Telecommunications reads: "Each Member shall ensure that service suppliers of any other Member may use public telecommunications transport networks and services for the movement of information within and across borders, including for intra-corporate communications of such service suppliers, and for access to information contained in data bases or otherwise stored in machine-readable form in the territory of any Member". Irion and Williams (n 30) 25.
[629] Meltzer (n 23) s42.
[630] Sen (n 191) 337; Chan-Mo Chung, 'Data Localization: The Causes, Evolving International Regimes and Korean Practices' (2018) 52 Journal of World Trade 187, 196–198; Mitchell and Mishra, 'Regulating Cross-Border Data Flows in a Data-Driven World: How WTO Law Can Contribute' (n 276).

Agreement.[631] Thus, existing literature seems to suggest that the GATS poses some limitations to the ability of governments to adopt certain AI-related measures.

Studies on the overall regulation of digital trade in international trade law also partly addressed the relationship between trade governance and AI governance.[632] Weber considers WTO law unable to provide for an "adequate legal framework encompassing digital trade rules".[633] Meltzer argues that the conclusion of the GATS in the 1990s compounded with the failure to update the services commitments limits the application of the agreement to digital trade issues.[634] Burri shares a similar view.[635] Thus, existing literature considers multilateral trade rules, and the GATS in particular, as potentially outdated with respect to digital technologies, including AI, and their impact on trade.

While most studies so far have looked at the relationship between international trade law and AI from the perspective of a key component (data) or digital technologies in general, only recently scholarly work has started to focus on the applicability of WTO rules to AI in particular. For example, using two hypothetical cases (i.e. a medical diagnostic AI-based system and insurance coverage decision-making AI), Chander discussed the applicability of the GATS to AI, finding that the agreement places some limits to the ability of governments to adopt measures that burden trade.[636] Zhang and Shang explored the extent to which current WTO agreements regulate trade in AI-powered products.[637] Liu and Lin discussed the challenges AI poses to the configuration and reconfiguration of global trade governance via examination of four issue areas – automated legal advice tools, automated driving systems, computer generated works, and automated decision-making processes.[638] Other scholars

[631] Sen (n 191) 337; Ferracane (n 26); Mitchell and Mishra, 'Regulating Cross-Border Data Flows in a Data-Driven World: How WTO Law Can Contribute' (n 276).
[632] Meltzer (n 23); Burri, 'The International Economic Law Framework for Digital Trade' (n 276); Weber (n 276); Sacha Wunsch-Vincent, 'Trade Rules for the Digital Age' in Marion Panizzon, Nicole Pohl and Pierre Sauvé (eds), *GATS and the Regulation of International Trade in Services* (Cambridge University Press 2008).
[633] Weber (n 276) 1.
[634] Meltzer (n 23) s39.
[635] Burri, 'The International Economic Law Framework for Digital Trade' (n 276) 40–42.
[636] Chander (n 32).
[637] Zhang and Shang (n 37) 41.
[638] Liu, Han-Wei and Lin, Ching-Fu (n 33).

investigated the extent to which international trade law shapes and influence AI governance and is need of reconfiguration.[639]

However, recognising that existing literature on the role that the GATS plays in addressing issues related to AI regulation remains rather limited, this chapter aims to investigate to what extent this agreement applies to AI-powered services and can limit the ability of governments to the adopt and implement AI-specific policies that may affect trade in services. This research does not intend to replicate the body of scholarly work that focused on the examination of AI-related policies (e.g., data localization requirements, data protection laws). Rather, it builds on it to focus on the treatment of AI-specific policies under the GATS, a topic that is currently underexplored.

This chapter starts with a brief description of the scope and structure of the GATS and an overview of its main provisions (Section 5.2). Intended as a reminder of the GATS key basic rules and exceptions rather than as a comprehensive and all-encompassing description and appraisal of the agreement, Section 5.2 seeks to provide the foundation for the analysis that follows in Section 5.3, which focuses on the assessment of some key legal challenges that artificial intelligence raises with respect to the relevance and applicability of GATS disciplines. It does so by focusing the analysis on the potential limitations to the scope of application of the agreement, the possible inconsistency of Al-specific measures with GATS obligations and commitments, and the extent to which governments may invoke the general and national security exceptions included in the agreement to justify the adoption of GATS non-conforming AI-specific measures. The chapter then discusses the draft proposal of the Artificial Intelligence Act advanced by the European Commission in April 2021 as a case study, with the purpose of illustrating the relationship between a government's right to regulate AI and its duty to comply with its GATS obligations and commitments (Section 5.4). For the purposes of this study, the analysis of the EU proposal will be limited to a brief description of its purpose, scope, risk-based categorisation of AI systems, and a short discussion of the analytical steps the Panels and the AB would have to follow

[639] Peng, Lin, Ching-Fu and Streinz (n 29).

in case the Artificial Intelligence Act (once formally adopted) were to be challenged under the WTO dispute settlement system. A more comprehensive and in-depth analysis of the AI regulation proposed by the European Commission under the GATS legal framework is left for future research. The chapter concludes with a few final remarks and observations in Section 5.5.

5.2 The General Agreement on Trade in Services (GATS)

In force since 1 January 1995, the General Agreement on Trade in Services (GATS) is part of the package of multilateral trade rules negotiated by the WTO Members during the Uruguay Round (1986-1994). As stated in the Preamble to the Agreement, "recognizing the growing importance of trade in services for the growth and development of the world economy", the WTO Members wished to establish a multilateral framework of principles and rules for trade in services in order to expand it under conditions of transparency and progressive liberalization, and promote the economic growth of all trading partners and the development of developing countries, in a manner that would promote the interests of all participants on a mutually advantageous basis and secure an overall balance of rights and obligations, while giving due respect to national policy objectives.

The GATS is divided into five parts. Part I and Part II provide a set of general rules and principles with respect to trade in services liberalization.[640] Part III and Part IV provide a framework for the negotiation of specific commitments. Lastly, Part V covers institutional provisions related to dispute settlement, the functioning of the Council for Trade in Services (CTS), technical cooperation, and the relationship with other international organizations.

Included in the GATS has also eight Annexes. Covering exemptions to the most-favoured-nation (MFN) obligation, movement of natural persons, air transport services, financial services, negotiations on maritime transport services, and telecommunications, they form an integral part of the Agreement (Article XXIX).

[640] Trebilcock, Howse and Eliason (n 422) 480.

5.2.1 Definitions and scope of application

Part I of the GATS covers scope and definitions, with Article I:1 establishing that the Agreement applies to "measures by Members affecting trade in services". Articles XXVIII, I:3(a), and I:2 of the GATS, Article XII of the Marrakesh Agreement on the Establishment of the World Trade Organization (Marrakesh Agreement), and WTO jurisprudence offer further clarifications on the scope of this provision, by providing definitions of the term 'measure', 'measures by Members', 'trade in services' and an interpretation of the meaning of the word 'affecting'.

Article XXIII(a) provides a broad definition of the term 'measure', which can take the form of law, regulation, rule, procedure, decision, administrative action, or any other form. Mavroidis opines that, based on this definition, under the Agreement substance counts more than form, meaning that as long as a measure is attributable to a WTO Member, irrespective of its form, it is covered by the GATS.[641] Concerns may arise as to whether the broad definition of 'measure' under Article XXIII(a) of the GATS would encompass also AI-specific policies, such as ethical guidelines and principles, that have yet to be translated into mandatory, binding laws and regulations. Based on Mavroidis' wider interpretation of the term 'measures', one could argue that any soft law instrument like guidelines, policies and principles adopted by a WTO Member could be covered by the Agreement. The finding by the Panel in *China – Publications and Audiovisual Products* that "acts setting forth rules or norms that are intended to have general and prospective application are measures subject to WTO dispute settlement", and that non-binding policy instruments can have normative value, if they provide administrative guidance and create expectations among the public and private actors, seems to support this view.[642] Consequently, AI ethical principles, national AI policies,

[641] Mavroidis (n 599) 195.

[642] Panel Report, *China — Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products*, WT/DS363/R, adopted on 19 January 2010 [7.172-7.173]; Appellate Body Report, *United States - Sunset Reviews of Anti-Dumping Measures on Oil Country Tubular Goods from Argentina*, WT/DS268/AB/R, adopted on 17 December 2004 [187]; Appellate Body Report, *United States - Sunset Review of Anti-Dumping Duties on Corrosion-Resistant Carbon Steel Flat Products from Japan*, WT/DS244/AB/R, adopted on 9 January 2004 [82, 87]; Mitsuo Matsushita and others, 'Trade in Services', *The World Trade Organization - Law, Practice and Policy* (3rd edn, Oxford University Press 2015) 565.

AI national standards, and AI regulations that have an effect on trade in AI-powered services could all be considered as 'measures' covered by the GATS, if it can be demonstrated that they all have normative value.

Article I:3(a) defines 'measures by Members' as measures taken by central, regional or local governments authorities and by non-governmental bodies in the exercise of powers delegated by governmental authorities. As Trebilcock, Howse and Eliason observe, the GATS departs from GATT practice by binding also other bodies beyond governmental entities, in recognition of the fact that, in some countries, various professional services (e.g. legal or health services) are often self-regulating in whole or in part, either exercising directly delegated powers or performing functions that in other countries would normally be given to a government agency.[643] It should be noted that, besides states, the WTO includes separate customs territories possessing full autonomy in the conduct of its external commercial relations (e.g. European Union) among its Members, as per Article XII of the Marrakesh Agreement.[644] Thus, measures adopted by the European Commission could also fall under the definition of 'measures by Members'. It follows that the EU draft regulation on AI, once finalised and adopted by the EU Parliament, could fall under the purview of Article I:3(a) of the GATS.

Article I:2 of the Agreement defines 'trade in services' as the supply of a service that takes place into four distinguished modes, differentiated on the basis of the location of the supplier and the consumer at the time the service is provided[645] or, rather, "on the basis of the origin of the service supplier and consumer, and the degree and type of territorial presence which they have at the moment the service is delivered".[646]

[643] Trebilcock, Howse and Eliason (n 422) 481.
[644] The European Union and all 27 individual EU Member States are among the 164 Members of the World Trade Organization. Since the EU has exclusive competence over the trade policy of the Union, it speaks at almost all WTO meetings on behalf of its Member States. World Trade Organization, 'European Union - Member Information' (*World Trade Organization*) <https://www.wto.org/english/thewto_e/countries_e/european_communities_e.htm> accessed 13 May 2021.
[645] Mavroidis (n 599) 208.
[646] Group of Negotiations on Services, 'Scheduling of Initial Commitments in Trade in Services: Explanatory Note' (Multilateral Trade Negotiations - The Uruguay Round 1993) MTN.GNS/W/164 7; WTO, Council for Trade in Services, 'Guidelines for the Scheduling of Specific Commitments under the General Agreement on Trade in Services (GATS)' S/L/92 8.

Cross-border trade (mode 1) refers to the supply of a service from the territory of one Member into the territory of any other Member (Article I:2(a)). Interpretation services provided by a supplier in country A using natural language processing techniques to a client in country B would likely fall under this category.

Consumption abroad (mode 2) covers the supply of a service in the territory of one Member to the service consumer of any other Member (Article I:2(b)). The supply of healthcare services involving AI systems (e.g., image diagnostic techniques) in country B to a patient from country A could be considered as mode 2.

Commercial presence (mode 3) refers to the supply of a service through the establishment of a commercial presence by a service supplier of one Member in the territory of any other Member (Article I:2(c)). A bank from country A offering AI-based fintech services to its clients in country B through its local branch would likely qualify as a mode 3 supply of services. Measures relating to foreign investment by suppliers of services fall under the scope of application of the Article I:2(c).[647]

Lastly, movement of natural persons (mode 4) covers services supplied through the presence of natural persons of a Member in the territory of any other Member (Article I:2(d)). A consultant from country A using AI software to deliver its services while in country B could fall under this category. Section 2 of the Annex on Movement of Natural Persons Supplying Services Under the Agreement excludes "measures affecting natural persons seeking access to the employment market of a Member, or measures regarding citizenship, residence or employment on a permanent basis" from the GATS coverage. Also, Article I:2(d) on the movement of natural persons covers only services supplied by a physical person, though the employer can be a juridical person.[648] As Section 5.3.1.2 discusses, future developments in the field of AI may

[647] Peter Van den Bossche and Werner Zdouc, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (3rd edn, Cambridge University Press 2013) 46; Trebilcock, Howse and Eliason (n 422) 480; Aaditya Mattoo and Pierre Sauvé, 'Regionalism in Services Trade' in Aaditya Mattoo, Robert M Stern and Gianni Zanini (eds), *A Handbook of International Trade in Services* (Oxford University Press 2008) 247.
[648] Mavroidis (n 599) 225.

raise concerns about the applicability of mode 4 to services provided by AI-enabled robots.[649]

Notably, the GATS is more comprehensive in coverage than the GATT, extending the definition of trade in services "beyond the traditional notion of cross-border exchanges to cover consumption movement and factor flows (investment and labour)".[650] Moreover, while the GATT is confined to the treatment of products, the scope of application of the GATS extends to both services and services suppliers. Thus, under the GATS, the treatment of AI service suppliers is as relevant as that of AI-powered services.

As regards the definition of 'measures by Members affecting trade in services', Article XXVIII (c) clarifies that they include measures in respect of:

> "*(i) the purchase, payment or use of a service;*
>
> *(ii) the access to and use of, in connection with the supply of a service, services which are required by those Members to be offered to the public generally;*
>
> *(iii) the presence, including commercial presence, of persons of a Member for the supply of a service in the territory of another Member".*

Mavroidis points out that this is not an exhaustive list and that, when evaluating whether a measure falls under the scope of application of Article XXVIII (c), the logic of this provision is to be understood as over- rather than under-inclusive.[651]

The GATS offers no specific definition of the term 'affecting', leaving the door open for interpretation. The AB filled this definitional void in the *EC – Bananas III* case, when it clarified that the word 'affecting' implies a measure that has 'an effect on', indicating a broader scope of application than terms such as 'regulating' or 'governing', and that Article XXVIII(c) does not narrow down the meaning of the term 'affecting' to 'in

[649] Liu, Han-Wei and Lin, Ching-Fu (n 33) 424–425.
[650] Rudolf Adlung and Aaditya Mattoo, 'The GATS' in Aaditya Mattoo, Robert M Stern and Gianni Zanini (eds), *A Handbook of International Trade in Services* (Oxford University Press 2008) 48.
[651] Mavroidis (n 599) 196.

respect of'.[652] Moreover, any measure that impacts the 'conditions of competition' in the supply of a services affects trade in services, even if the measure regulates other matters.[653] This means that a measure that regulates the use of artificial intelligence could be considered a measure 'affecting' trade in services to the extent that it satisfies the two-tier test established by the AB in *Canada – Autos*: (i) there is trade in services (i.e. one of the four modes of supply listed in Article I:2 of the GATS); and (ii) the measure at issue affects trade in services.[654] This means that in order to determine whether a measure regulating AI affects trade in services, one has to demonstrate "*how* the service at hand is being supplied in a given market, *who* supplies the services, and *how* the measure at hand affects the supply of the service in the same market".[655] Explaining how a measure regulating AI affects trade in services is especially important when said measure could be scrutinised under both the GATT and the GATS.[656]

The GATS offers no definition of the term 'service'. Article I:3 simply states that 'services' include any service in any sector except services supplied in the exercise of governmental authority, meaning services supplied neither on a commercial basis, nor in competition with one or more service suppliers. This means that services employing facial recognition for law enforcement purposes would fall outside the scope of application of the GATS. However, if they are used for commercial purposes (e.g., to monitor the flux of customers in commercial establishments or to enable electronic payments), they could be considered as 'services' under Article I:3 of the GATS.

Article XXVII offers little more information about the term 'supply of a service' besides clarifying that it includes the production, distribution, marketing, sale, and delivery of a service. WTO jurisprudence also has yet to define it in abstract terms, relying instead on a case-by-case approach.[657] That said, according to the 'Services Sectoral Classification List' ('document W/120'), compiled in 1991 to facilitate the scheduling of

[652] AB Report, *EC - Bananas III* (n 422) para 220.
[653] Peter Van den Bossche and Denise Prévost, *Essentials of WTO Law* (Cambridge University Press 2016) 26; Matsushita and others (n 642) 565–566.
[654] Appellate Body Report, *Canada — Certain Measures Affecting the Automotive Industry*, WT/DS139/AB/R WT/DS142/AB/R, adopted on 19 June 2000 [155].
[655] Matsushita and others (n 642) 567.
[656] ibid 566; AB Report, *EC - Bananas III* (n 422) 221.
[657] Weber and Burri (n 623) 3.

commitments under the GATS, there are eleven explicitly identifiable services sectors that fall under the scope of application of the Agreement (business services; communication services; construction and related engineering services; distribution services; educational services; financial services; health related and social services; tourism and travel related services; recreational, cultural and sporting services; and transport services) and a residual category encompassing any other service not included elsewhere[658]. As Section 5.3 discusses, establishing the extent to which AI-powered services are services covered by the GATS under the existing classification system can prove challenging, with significant repercussions on the operationalisation of the Agreement.[659]

5.2.2 General obligations and disciplines: MFN and transparency

Part II of the GATS contains a list of general obligations and disciplines that can apply either unconditionally or conditionally.[660] Unconditional general obligations, which apply to all services sectors, include Article II on the most-favoured-nation treatment and Article III on transparency.[661] Conditional general obligations, contingent on the existence of specific commitments, include domestic regulation (all disciplines in Article VI, with the exception of comma 2), monopolies (Article VIII, with the exception of comma 1), and payments and transfers (Article XI).

Article II of the GATS covers one of the two key WTO principles of non-discrimination, the most-favoured-nation treatment.[662] The MFN obligation imposes on each member to accord, immediately and unconditionally, to services and service suppliers of any other WTO member treatment no less favourable than it accords to like services and service suppliers of any other country, irrespective of its membership to the WTO. As such, WTO Members cannot treat non-WTO members better than fellow members of

[658] WTO, 'Services Sectoral Classification List, Note by the Secretariat, MTN.GNS/W/120 (10 July 1991)'.
[659] Zhang (n 63) 1–2.
[660] Matsushita and others (n 642) 567.
[661] Other unconditional general obligations include Article VI:2 on availability of legal remedies, Article VIII:1 on compliance of monopoly suppliers with the MFN obligation, and Article XV:2 on consultations over subsidies that affect trade. ibid 567–578.
[662] National treatment, spelled out in Article XVII of the GATS, is the other.

the organization.[663] As Van den Bossche and Prévost point out, the overall purpose of the MFN treatment obligation is to "ensure all WTO members *equality of opportunity* to supply services regardless of the origin or destination of the services or the nationality of the service suppliers".[664] Pursuant to Article II:2, WTO members can maintain MFN-inconsistent measures, provided that the latter are listed in and meet the conditions of the Annex on MFN exceptions at the time of their accession (Article II:2). Also, Article V allows WTO Members to deviate from the MFN obligation by entering into preferential trade agreements, provided that the latter establish a significant degree of economic integration through 'substantial sectoral coverage' and the 'elimination of substantially all discrimination'.[665]

WTO jurisprudence provides additional guidance on the interpretation of the MFN treatment obligation. After clarifying, in the *EC – Bananas III* case, that Article II:1 covers both *de jure* and *de facto* discrimination, the Appellate Body suggested a three-step test to assess the consistency of measures with the MFN treatment obligation, based on a determination of whether the these measures fall within the scope of application of Article I:1, whether the services or services suppliers concerned are 'like services or services suppliers', and whether like services or services suppliers are accorded treatment less favourable.[666] Unfortunately, case law on the meaning of the terms 'like services' and 'like services suppliers' under Article II:1 of the GATS is rather limited.[667] Indeed, following the Panels' findings in *EC – Bananas III* and *Canada – Autos* that to the extent that the services suppliers under consideration supply the same services they are 'like service suppliers', the AB in *Argentina – Financial Services* added that the concept of 'likeness' under Article II:1 of the GATS is concerned with the competitive relationship of services and services suppliers and that likeness can only be determined on a case-by-case basis.[668] The *Argentina – Financial Services* case

[663] Mavroidis (n 599) 291.
[664] Van den Bossche and Prévost (n 653) 22; Van den Bossche and Zdouc (n 647) 335.
[665] Matsushita and others (n 642) 573–574.
[666] AB Report, *EC - Bananas III* (n 422) para 234; AB Report, *Canada - Autos* (n 654) 170–171; Van den Bossche and Zdouc (n 647) 337.
[667] Van den Bossche and Zdouc (n 647) 343.
[668] Panel Report, *European Communities — Regime for the Importation, Sale and Distribution of Bananas*, WT/DS27/R/USA, adopted on 22 May 1997 [7.322]; Panel Report, *Canada — Certain Measures*

also offers clarifications on the interpretation of the legal standard of 'treatment no less favourable' under Article II:1 of the GATS, which the AB identified with the modification of the "conditions of competition to the detriment of like services or service suppliers of any other Member".[669]

Article III of the GATS on transparency sets out the other unconditional general obligation that WTO members are also expected to comply with. As Mavroidis points out, in GATS transparency is especially important since trade in services is affected by behind-the-border policies that are unliterally designed and seldom, if at all, negotiated.[670] Article III:1 requires Members to publish all relevant measures of general application which pertain to or affect the operation of the Agreement, as well as international agreements pertaining to or affecting trade in services to which they are signatories. Of narrower scope is Article III:3, which mandates WTO Members to promptly inform the CTS – at least once a year - of new or amended laws, regulations or administrative guidelines which significantly affect trade in services covered by their specific commitments. This provision is particularly relevant for services sectors that are heavily regulated, such as healthcare and banking. Article III also contains an obligation to establish enquiry points for the purpose of providing specific information to other Members, upon request, on measures affecting trade in services.

Notably, according to the 1999 Progress Report submitted by the CTS to the General Council on its discussions under the Work Programme on Electronic Commerce, the WTO membership is of the general view that the MFN obligation is applicable to the supply of services through electronic means and that the obligations of Article III on transparency apply to all laws and regulations affecting the supply of a services through electronic means.[671] Therefore, one can infer that WTO Members would consider Article II and Article III of the GATS to apply to the supply of services powered

Affecting the Automotive Industry, WT/DS139/R, WT/DS142/R, adopted on 11 February 2000 10.248; Appellate Body Report, *Argentina — Measures Relating to Trade in Goods and Services*, WT/DS453/AB/R, adopted on 9 May 2016 [6.25-6.26].

[669] AB Report, *Argentina - Financial Services* (n 668) para 6.111.

[670] Mavroidis (n 599) 401.

[671] WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce, Progress Report to the General Council, Adopted by the Council for Trade In Services on 19 July 1999 (27 July 1999)' S/L/74 2.

or enabled by artificial intelligence. Thus, AI policies that WTO Members may implement in the form of laws, regulations or the like should be notified to the CTS if they affect trade in services, though compliance with Article III:3 of the GATS has been rather low.[672]

Additional generally applicable obligations can be found on Article VIII and IX of the GATS. The former aims at ensuring that a Member's monopolies and exclusive service suppliers do not operate in a manner that is inconsistent with its MFN obligation and specific commitments, whereas the latter obliges WTO Members to enter into consultation, upon request, for the elimination of certain business practices that may restrain competition and thereby restrict trade in services.[673] Considering that some of the key players in the development of AI are giant technological corporations often accused of abusing their dominant position in the market (e.g. Google, Metaverso), one could argue that these provisions, and Article IX in particular, may be relevant to artificial intelligence.

5.2.3 Specific Commitments: Market Access and National Treatment

In addition to general obligations, the GATS contains several disciplines applicable only to the commitments that each Member set out in their Schedule of Specific Commitments. An integral part of the Agreement (Article XX:3), the GATS schedules are a legal instrument that all WTO Members must submit at the time of their accession (Article XX:1) designed to specify the terms of market access (MA) and national treatment (NT) that each Member undertakes in individual sectors.[674] Thus, the obligations on market access (Article XVI), national treatment (Article XVII), and additional commitments (Article XVIII) laid out in Part III of the Agreement arise only with respect to the sectors and sub-sectors that a Member has listed in its Schedule ('bottom-up approach').[675]

[672] Martin Roy, 'Charting the Evolving Landscape of Services Trade Policies: Recent Patterns of Protection and Liberalization' in Pierre Sauvé and Martin Roy (eds), *Research Handbook on Trade in Services* (Edward Elgar Publishing 2016) 28.
[673] Matsushita and others (n 642) 578.
[674] Adlung and Mattoo (n 650) 54; Van den Bossche and Zdouc (n 647) 522.
[675] Adlung and Mattoo (n 650) 54.

In their pursuit of trade liberalization, the GATS grants WTO Members greater flexibility and policy space than the GATT. It gives them ample margin to decide the level of services trade liberalization they intend to achieve, both in terms of scope (i.e., sectors where they intend to undertake commitments) and depth (i.e., extent of limitations they inscribe for each sector and mode of supply under MA, NT, and additional commitments). [676] According to the Guidelines for the Scheduling of Specific Commitments, each commitment in a given sector for each mode of supply can take four different forms. By inscribing the term 'none' a Member indicates full commitment or absence of any form of limitation under market access or national treatment. Inscribing an explicit limitation signals that the commitment is subject to terms and conditions. By inscribing the term 'unbound' a Member indicates its desire to remain free to introduce or maintain measures inconsistent with Article XVI or XVII of the GATS. Lastly, a Member can inscribe the term 'Unbound*' to indicate that it cannot undertake any commitment because the relevant mode of supply may not be technically feasible.[677]

Reaffirming the application of the MFN principle to specific commitments, Article XVI:1 of the GATS establishes that "each Member shall accord services and service suppliers of any other Member treatment no less favourable than that provided for under the terms, limitations and conditions agreed and specified in its Schedule".[678] The Article further clarifies that, in the sectors listed in their Schedule, a WTO Member is not allowed to adopt or maintain six types of restrictive measures unless it inscribes the relevant limitations in its GATS Schedule. [679] Included in Article XVI:2 are five quantitative limitations (i.e. limitations on the number of service suppliers; limitations on the total value of service transactions or assets; limitations on the total number of service operations or on the total quantity of service output; limitations on the total number of natural persons that may be employed in a particular service sector or that a service supplier may employ or who are necessary for, or directly related to, the

[676] Matsushita and others (n 642) 585–586; Weber and Burri (n 623) 31.
[677] WTO, Council for Trade in Services, 'WTO Doc. S/L/92' (n 646) paras 41–47.
[678] Mavroidis (n 599) 350.
[679] Adlung and Mattoo (n 650) 57.

supply of a specific service; and limitations on the participation of foreign capital in terms of maximum percentage limit on foreign shareholding or the total value of individual or aggregate foreign investment), and a qualitative restriction (measures restricting or requiring specific types of legal entity or joint venture through which a service supplier may supply a service). This is an exhaustive list.[680]

Article XVII of the GATS establishes that Members making specific commitments must comply with the obligation to grant national treatment, by according to services and service suppliers of any other Member, in respect of all measures affecting the supply of services, formally identical or formally different treatment no less favourable than that they accord to their own like services and service suppliers.[681] Article XX:2 of the GATS on the Schedules of Specific Commitments clarifies that WTO Members must inscribe measures inconsistent with both the MA and NT obligation in the column relating to Article XVI on market access. Discriminatory measures scheduled in the market access column will be considered as scheduled also under Article XVII and, thus, subject to the conditions of that Article.[682]

WTO jurisprudence offers additional clarifications on the interpretation of the national treatment obligation. First of all, WTO adjudicators put forward a three-pronged test to evaluate the consistency of measures with Article XVII of the GATS, based on a determination of whether the services at issue are inscribed in a Member's schedule and the extent to which a national treatment commitment was made in respect to the relevant services sector; whether the measure at issue affects the supply of these services; and whether these measures accord less favourable treatment to service suppliers of other Members, in comparison to like domestic suppliers. [683] Secondly, as regards the scope of Article XVII of the GATS, the Panel in *China – Electronic Payments* observed that it extends generally to "all measures affecting the supply of services".[684]

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[680] Panel Report, *United States — Measures Affecting the Cross-Border Supply of Gambling and Betting Services*, WT/DS285/R, adopted on 20 April 2005 6.298.
[681] Mavroidis (n 599) 369.
[682] WTO, Council for Trade in Services, 'WTO Doc. S/L/92' (n 646) 7.
[683] Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.1272; Panel Report, *China — Certain Measures Affecting Electronic Payment Services,* WT/DS413/R, adopted on 31 August 2012 [7.641]; Van den Bossche and Zdouc (n 647) 406.
[684] *Panel Report, China — Electronic Payment Services* (n 683) para 7.652.

Indeed, as clarified in the Scheduling Guidelines, Article XVII does not contain an exhaustive listing of the types of measure which would constitute limitations on national treatment.[685] Moreover, with respect to the determination of likeness, the same Panel opined that "the determinations of 'like services', and 'like service suppliers', should be made on a case-by-case basis [and that] the likeness determination should be based on arguments and evidence that pertain to the competitive relationship of the services being compared".[686] In addition to it, the Panel in *EU – Bananas III* opined that "to the extent that entities provide these like services, they are like service suppliers".[687] Lastly, on the concept of 'treatment no less favourable', the Panel in *China – Publications and Audiovisual Products* stated that this obligation must be assessed in terms of competitive opportunities because, as specified in Article XVII:3, "formally identical or formally different treatment shall be considered to be less favourable if it modified the conditions of competition in favour of services or service suppliers of the Member compared to like services or service suppliers of any other Member".[688] Several scholars opine that the purpose of Article XVII of the GATS is essentially to guarantee that foreign services and service suppliers can profit from conditions of competition no less favourable than those benefiting like domestic services and service suppliers.[689]

Pursuant to Article XVIII, Members may inscribe additional commitments not subject to scheduling under market access and national treatment. These may relate to the adoption of international standards or specified competition disciplines.[690] For example, the WTO Members incorporated the Reference Paper on Telecommunications[691] in their GATS schedules as additional commitments.[692] The participants to the Joint

[685] WTO, Council for Trade in Services, 'WTO Doc. S/L/92' (n 646) 6.
[686] Panel Report, *China — Electronic Payment Services* (n 683) para 7.701-7.702.
[687] Panel Report, *EU - Bananas III* (n 668) para 7.322.
[688] Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.978.
[689] Mireille Cossy, 'Some Thoughts on the Concept of "likeness" in the GATS' in Marion Panizzon, Nicole Pohl and Pierre Sauvé (eds), *GATS and the Regulation of International Trade in Services* (Cambridge University Press 2008) 328; Adlung and Soprana (n 398) 43.
[690] Adlung and Soprana (n 398) 43.
[691] WTO, 'Negotiating Group on Basic Telecommunications, Telecommunication Services: Reference Paper, 24 April 1996' <https://www.wto.org/english/tratop_e/serv_e/telecom_e/tel23_e.htm> accessed 8 December 2021.
[692] Matsushita and others (n 642) 612.

Initiative (JI)[693] on Services Domestic Regulation (SDR)[694] also intend to incorporate the disciplines in the Reference Paper on SDR as additional commitments pursuant to Article XVIII of the GATS.[695]

5.2.4 The Built-in Negotiating Agenda

In the GATS there are several provisions that mandate future negotiations on rules in the areas of domestic regulation, subsidies, safeguards, and government procurement. This is a 'built-in agenda' that, according to several scholars, makes services negotiations not strictly dependent on the new round of services negotiations under the Doha Mandate.[696]

5.2.4.1 Domestic regulation

Adlung and Mattoo observe that the GATS does not constraint a government's ability to pursue the regulatory objectives that it deems appropriate.[697] As stated in the GATS Preamble, WTO Members recognize:

> *"the right of Members to regulate, and to introduce new regulations, on the supply of services within their territories in order to meet national policy objectives and, given asymmetries existing with respect to the degree of development of services regulations in different countries, the particular need of developing countries to exercise this right".*

However, in recognition that domestic regulation could pose an unnecessary barrier to trade, the GATS includes a specific provision - Article VI – that, coupled with non-discrimination and market access obligations, plays a key role in the trade in services

[693] Although the terms 'Joint Statement Initiative' and 'JSI' have also been commonly used to identify these plurilateral negotiations that not part of a multilaterally agreed WTO process, this study adopts the WTO approach, which prefers the use of the terms 'Joint Statement' and 'JI' to identify the negotiations on services domestic regulation, electronic commerce and investment facilitations for development launched at the Eleventh Ministerial Conference. 'Joint Initiatives' (*World Trade Organization*) <https://www.wto.org/english/tratop_e/jsi_e/jsi_e.htm#fnt-1> accessed 6 April 2022.
[694] WTO, 'Joint Ministerial Statement on Services Domestic Regulation (13 December 2017)' WT/MIN(17)/61.
[695] Joint Initiative on Services Domestic Regulation, 'Reference Paper on Services Domestic Regulation (27 September 2021)' INF/SDR/1 para 4.
[696] Trebilcock, Howse and Eliason (n 422) 495; Adlung and Mattoo (n 650) 70.
[697] Adlung and Mattoo (n 650) 66.

liberalization process.[698] Indeed, as Lim and De Meester observe, the drafters of the GATS designed disciplines around three types of measures: (i) discriminatory and non-discriminatory quantitative restrictions on entry/establishment (including legal from requirements), addressed in Article XVI; (ii) discriminatory measures modifying the conditions of competition in favour of domestic services and service suppliers, covered under Article XVII; and (iii) domestic regulations that are neither discriminatory nor quantitative in nature, addressed in Article VI.[699] However, some scholars pointed out a confusing overlap between these measures and their treatment under the GATS.[700]

Article VI of the GATS imposes a set of general conditional and unconditional obligations on WTO Members with respect to the implementation of domestic regulatory measures, which broadly refer to the regulation of the quality of the service or the manner in which a service must be supplied.[701] Paragraph 1 establishes that, in the sectors inscribed in the schedules of specific commitments, all measures of general application affecting trade in services must be administered in a reasonable, objective and impartial manner. This provision aims to prohibit the arbitrary and biased application and administration of domestic regulations and to ensure consistent and predictable administrative decisions.[702] Paragraph 2 and 3 instruct Members to establish judicial, arbitral or administrative tribunals where suppliers can raise their concerns and seek remedy, and oblige regulatory authorities to inform the service

[698] ibid 67; Aaditya Mattoo and Pierre Sauvé, 'Domestic Regulation and Trade in Services: Key Issues' in Aaditya Mattoo and Pierre Sauvé (eds), *Domestic Regulation and Service Trade Liberalization* (World Bank Publications 2003) 3; Markus Krajewski, 'Domestic Regulation and Services Trade: Lessons From Regional And Bilateral Free Trade Agreements' in Pierre Sauvé and Martin Roy (eds), *Research Handbook on Trade in Services* (Edward Elgar Publishing 2016) 219.
[699] Aik Hoe Lim and Bart De Meester, 'An Introduction to Domestic Regulation and the GATS' in Aik Hoe Lim and Bart De Meester (eds), *WTO Domestic Regulation and Services Trade: Putting Principles into Practice* (Cambridge University Press 2014) 2.
[700] Joost Pauwelyn, 'Rien Ne Va Plus? Distinguishing Domestic Regulation from Market Access in GATT and GATS' (2005) 4 World Trade Review 131; Andrew TF Lang, 'GATS' in Daniel Bethlehem and others (eds), *The Oxford Handbook of International Trade Law* (Oxford University Press 2009) 178; Panagiotis Delimatsis, 'Don't Gamble with the GATS - The Interaction Between Articles VI, XVI, XVII and XVIII GATS in the Light of the US-Gambling Case' (2006) 40 Journal of World Trade 1059.
[701] Pauwelyn (n 700) 169.
[702] Krajewski (n 698) 218.

suppliers that require authorization for the supply of a service of the outcome of their application within a reasonable period of time.[703]

Article VI:4 contains a negotiating mandate for the Members to develop any necessary disciplines to ensure that measures relating to qualification requirements and procedures, technical standards and licensing requirements do not constitute unnecessary barriers to trade, specifying that the new disciplines must ensure that these requirements are: (a) based on objective and transparent criteria, such as competence and the ability to supply the services: (b) are not more burdensome than necessary to ensure the quality of the services; and (c) are not in themselves a restriction on the supply of a service (in the case of licensing procedures).[704] As Krajewski points out, the rationale for negotiating disciplines under Article VI:4 is that domestic regulations can act as a barrier to trade even if the regulations are neither discriminatory nor a restriction to market access in the formal sense, and thus it is necessary to ensure that they do not render market access and national treatment commitments meaningless.[705] Pending the negotiation of new disciplines under Article VI:4, Article VI:5 of the GATS prohibits WTO Members from applying, in the sectors where specific commitments where undertaken, licensing and qualification requirements and technical standards that nullify or impair said commitments that do not comply with the set of criteria set out in Article VI:4 and could not reasonably have been expected of that Member at the time it made those specific commitments. Account shall be taken of international standards of relevant international organizations applied by a Member, in determining whether said Member is in compliance with Article VI:5(a). Some scholars argue that Article VI:5 contains a "standstill clause in the form of a nullification and impairment standard" or reads as "granfathering" all existing restrictive requirements, thus limiting the scope for translating GATS commitments into effective market access.[706]

[703] Mavroidis (n 599) 268.
[704] Adlung and Mattoo (n 650) 67.
[705] Krajewski (n 698) 219, 223.
[706] ibid 220; Aaditya Mattoo, 'National Treatment in the GATS - Corner Stone or Pandora's Box?' (1997) 31 Journal of World Trade 107, 130.

So far, advances in the development of new disciplines on domestic regulation under Article VI:4 of the GATS have been rather limited. WTO Members negotiated the Guidelines for Mutual Recognition of Accountancy Qualifications[707], and the Disciplines on Domestic Regulation in the Accountancy Sector[708] in the Working Party on Professional Services (WPPS). The former are non-binding and the latter, which would be applicable to those members who inscribed specific commitments on accountancy in their schedules, never entered into force, as they were supposed to be integrated in the GATS at the end of the Doha Round services negotiations, which WTO Members have not concluded.[709] Little progress has also been made in the Working Party on Domestic Regulation (WPDR), which was set up in 1999 in lieu of the WPPS to develop "any necessary disciplines to ensure that measures relating to licensing requirements and procedures, technical standards and qualification requirements and procedures do not constitute unnecessary barriers to trade in services".[710]

Notably, some progress on the development of new disciplines on services domestic regulation was recently achieved under the JI on SDR, a plurilateral initiative that is considered to fall outside the mandate of Article VI:4 of the GATS. On December 2, 2021 a group of 67 WTO Members announced the conclusion of the negotiations on the Reference Paper on Services Domestic Regulation, which contains a set of new disciplines that will be applicable to WTO Members that incorporate them into their GATS schedules.[711]

[707] WTO, Council for Trade in Services, 'Guidelines for Mutual Recognition of Accountancy Qualifications' S/L/38.
[708] WTO, 'Disciplines on Domestic Regulation in the Accountancy Sector (17 December 1998)' S/L/64.
[709] Matsushita and others (n 642) 579–580; WTO, 'Decision on Disciplines Relating to the Accountancy Sector, Adopted by the Council for Trade in Services on 14 December 1998' S/L/63; WTO, 'WTO Negotiations on Domestic Regulation Disciplines' (*World Trade Organization*) <https://www.wto.org/english/tratop_e/serv_e/dom_reg_negs_e.htm> accessed 9 December 2021.
[710] WTO, 'Decision on Domestic Regulation, Adopted by the Council for Trade in Services on 26 April 1999 (28 April 1999)' S/L/70.
[711] WTO, 'Declaration on the Conclusion of Negotiations on Services Domestic Regulation (2 December 2021)' WT/L/1129.

5.2.4.2 Safeguards, Government Procurement and Subsidies

Among the 'outstanding' rule-making issues left open for further discussion after the conclusion of the Uruguay Round are safeguards, government procurement, and subsidies.[712] The GATS drafters mandated for the negotiation of multilateral disciplines on emergency safeguards measures relating to trade in services (Article X), government procurement in services (Article XIII), and subsidies that may have distortive effects on trade in services (Article XV). However, while Article X:1 and Article XIII:2 include a time limit for concluding or starting negotiations on safeguards and government procurement[713], Article XV provides no specific time-frame for the negotiation of multilateral disciplines on services subsidies.[714]

Little progress has been achieved so far on any of the three issues and, in the case of safeguards, the initial deadline for the conclusion of the multilateral negotiations has long expired. The last meeting of the Working Party on GATS Rules (WPGR)[715] where Members held some meaningful discussion on safeguards and government procurement dates back to 2016, when WTO Members also recognized that negotiations on subsidies had been at an impasse for some time.[716] Several scholars expressed doubts about the likelihood that negotiations under Article X, XIII and XV can reach a meaningful outcome any time soon.[717]

If at multilateral level WTO Members have been unable to significantly advance the rule-making agenda on any of these three areas, some developments occurred at

[712] Bernard M Hoekman and Michel M Kosteccki, *The Political Economy of the World Trading System - The WTO and Beyond* (3rd edn, Oxford University Press 2009) 354.
[713] Article X:1 of the GATS states that the results of multilateral negotiations on the question of emergency safeguard measures based on the principle of non-discrimination "shall enter into effect on a date not later than three years from the date of entry into force of the WTO Agreement". According to Article XIII:2 of the GATS, "[t]here shall be multilateral negotiations on government procurement in services under this Agreement within two years from the date of entry into force of the WTO Agreement".
[714] Footnote 7 to Article XV:2 of the GATS indicates that a future work programme will determine how, and in what timeframe, negotiations on multilateral disciplines on services subsidies will be conducted.
[715] Established in 1995 by the Council for Trade in Services, the Working Party on GATS Rules is tasked with carrying out negotiations under Article X, Article XII and Article X of the GATS.
[716] WTO, Working Party on GATS Rules, 'Annual Report of the Working Party on GATS Rules to the Council for Trade in Services -2016 (23 November 2016)' S/WPGR/27 2.
[717] Van den Bossche and Zdouc (n 647) 635; Mavroidis (n 599) 339–341; Pierre Sauvé and Marta Soprana, 'Disciplining Service Sector Subsidies: Where Do We Stand and Where Can We (Realistically) Go?' (2018) 21 Journal of International Economic Law 599, 617.

plurilateral level, at least as far as government procurement is concerned. Indeed, in March 2012 the Government Procurement Agreement (GPA), a Plurilateral Trade Agreement under Annex 4 of the Marrakesh Agreement, was formally adopted pursuant to Article X:9 of the Marrakesh Agreement.[718] In force since 6 April 2014, the agreement applies only to its 21 Parties, covering a sub-set of the WTO membership.[719] This means that the GPA is not applied on an MFN basis and does not create either rights or obligations for WTO Members that have not accepted it (Article ll:3 of the Marrakesh Agreement). The agreement applies to any measure regarding government procurement, "whether or not it is conducted exclusively or partially by electronic means" (Article II: 1 of the GPA), and covers government procurement of goods, services, or a combination thereof, as specified in each Party's schedule, though procurement for commercial purposes is excluded (Article II:2(a) of the GPA). Consequently, AI-specific policies that may affect the government procurement of AI-powered services could fall under the scope of application of the GPA. A thorough analysis of this scenario is beyond the purview of the study and is left for future research.

5.2.5 Exceptions

WTO Members may justify the adoption and implementation of measures inconsistent with the obligations and commitments under the GATS either on the basis of a set of general exceptions (Article XIV) or for national security purposes (Article XIV*bis*). The

[718] Attempts to bring government procurement under internationally agreed trade rules date back to the late 1970s, with the signature of the first (non-MFN) agreement, the Tokyo Round Code on Government Procurement. Amended in 1986, the agreement was further renegotiated, leading to the signature of the Government Procurement Agreement in 1994 (GPA 1994), which entered into force in 1996. The current GPA (also known as GPA 2012) is the result of renegotiations according to Article XXIV:9 of the GPA 1994. WTO, 'Agreement on Government Procurement' (*World Trade Organization*) <https://www.wto.org/english/tratop_e/gproc_e/gp_gpa_e.htm> accessed 21 April 2022.

[719] The 21 Parties to the GPA cover 48 WTO Members, counting the EU and its 27 Member States as one party. The other signatories include Armenia, Australia, Canada, Hong Kong, Iceland, Israel, Japan, South Korea, Liechtenstein, Moldova, Montenegro, Netherlands (with respect to Aruba), New Zealand, Norway, Singapore, Switzerland, Chinese Taipei, Ukraine, United Kingdom and United States. Of the 35 WTO Members that enjoy observer status in the Committee on Government Procurement, 11 are in the process of acceding the GPA (i.e. Albania, Brazil, China, Georgia, Jordan, Kazakhstan, Kyrgyz Republic, North Macedonia, Oman, Russian Federation, and Tajikistan). WTO, 'Agreement on Government Procurement - Parties, Observers and Accessions' (*World Trade Organization*) <https://www.wto.org/english/tratop_e/gproc_e/memobs_e.htm> accessed 21 April 2022.

Agreement also contains a sector-specific exception, the so-called 'prudential carve-out' for measures affecting the supply of financial services (Annex on Financial Services).[720] While this section is dedicated to providing an overview of the GATS exceptions, Section 5.3.3 explores more in detail how GATS-inconsistent AI-specific policies could be justified under Article XIV and Article XIV *bis* of the Agreement.

According to Article XIV of the GATS, there are five general reasons that Members can put forward to justify the imposition of measures that are in violation of GATS provisions. First, WTO members may claim these measures are "necessary to protect public morals or to maintain public order", where the public order exception may be invoked only in case "a genuine and sufficiently serious threat is posed to one of the fundamental interests of society" (Article XVI(a), and footnote 5). Inconsistent measures may also be justified as "necessary to protect human, animal or plant life or else" (Article XIV(b)). Moreover, WTO Members may deem necessary to introduce measures that are illicit under the GATS in order to "secure compliance with laws and regulations which are not inconsistent with the provisions of the Agreement, including those relating to" the prevention of deceptive and fraudulent practices, the protection of privacy, and safety (Article XVI(c)). Measures inconsistent with the national treatment obligation may be justified "provided that the difference in treatment is aimed at ensuring the equitable or effective imposition or collection of direct taxes in respect of services or services suppliers of other Members" (Article XIV(d)). Lastly, measures inconsistent with the MFN obligation may be justified provided that the difference in treatment is to avoid double taxation (Article XIV(e)).

However, a provisional justification under one of the specific exceptions set out in paragraphs (a) to (e) of Article XIV of the GATS does not suffice to justify a measure under Article XIV of the Agreement.[721] The Appellate Body in *US – Gambling* clarified that, in order to determine whether a measure can be justified under Article XIV of the

[720] The GATS provides for an additional exception for maintaining measures not in compliance with the GATS for the purpose of safeguarding the balance of payments (Article XII).
[721] Van den Bossche and Zdouc (n 647) 584.

GATS, a Panel should carry out a 'two-tier analysis' consisting of a determination of whether the challenged measure:

1) falls within the scope of any of the five general exceptions specific in paragraphs (a) to (e) of the Article;

2) satisfies the requirements of the chapeau of Article XIV, which establishes that the measure is not applied in a manner which would constitute either a means of arbitrary or unjustifiable discrimination between countries where like conditions prevail, or a disguised restriction to trade".[722]

Members may also justify the imposition of GATS-inconsistent measures on the basis of national or international security reasons. Article XIV*bis*(1)(b) establishes that nothing in the Agreement prevents any WTO Member from adopting or implementing measures that it considers necessary for the protection of its essential security interests, indicating that these measures can fall under any of the following three categories:

i. measures related to the supply of services carried out directly or indirectly for the purpose of provisioning a military establishment;

ii. relating to fissionable and fusionable materials (or the materials for which they are derived); or

iii. taken in time of war or other emergency in international relations.

Article XIV*bis*(1) also establishes that a WTO Member may derogate to any GATS obligation that requires it to provide information that, if disclosed, would be deemed contrary to its essential security interests (letter (a)) or prevents the Member from complying with its obligations under the United Nations Charter for the maintenance of international peace and security (letter (c)).[723] According to Delimatsis and Hrynkiv, "Art. XIV *bis* seeks to strike a proper balance between Members' prerogative to pursue or protect a legitimate security interest even through WTO-inconsistent means, and

[722] AB Report, *US-Gambling* (n 64) para 292.
[723] Panos Delimatsis and Olga Hrynkiv, 'Security Exceptions under the GATS – A Legal Commentary on Article XIVbis GATS (TILEC Discussion Paper No. 2020-026)' (2020) para 21.

the interest of other Members in avoiding any frustration of their rights accorded by the GATS substantive rules".[724] So far, no WTO Member has ever invoked Article XIV*bis* before a Panel in a WTO dispute as justification for the imposition of GATS-inconsistent measures.

The GATS agreement includes also a 'prudential carve-out', a specific exception for measures affecting the supply of financial services.[725] Paragraph 2 of the Annex on Financial Services states that, "[n]otwithstanding any other provisions of the GATS, a WTO Member may take measures for prudential reasons, including for the protection of investors, depositors, policy holders or persons to whom a fiduciary duty is owed by a financial service supplier, or to ensure the integrity and stability of the financial system", clarifying that, in case these measures are GATS-inconsistent, the Member shall not use them as a means of avoiding their obligations or commitments under the Agreement. As the Annex on Financial Services focuses on the prudential reasons behind the adoption of certain measures, rather than on what types of 'prudential measures' should be prohibited or allowed, measures adopted for prudential reasons may touch upon other GATS obligations, including market access and national treatment.[726]

5.3 Legal challenges posed by AI and AI-specific policies

The commercialization of AI applications after the conclusion of the Uruguay Round negotiations and the establishment of the WTO, as well as the governments' response to this phenomenon pose a few legal challenges with regards to the application of the GATS to services that utilize, are powered by, or are enabled by this technology. AI and AI-specific policies raise different issues across each of the different analytical steps that, based on WTO jurisprudence, are necessary to assess whether a member has adopted or implemented a measure that is inconsistent with its obligations and commitments under the GATS Agreement. The first step consists in a determination

[724] ibid 5.
[725] Mavroidis (n 599) 480.
[726] Juan Marchetti, 'The GATS Prudential Carve-Out' in Panagiotis Delimatsis and Nils Herger (eds), *Financial Regulation at the Crossroads: Implications for Supervision, Institutional Design and Trade* (Kluwer Law International BV 2011) 286.

that the measure at issue is a 'measure affecting trade in services' under the meaning of Article I:1 of the GATS.[727] Artificial intelligence raises issues regarding the classification of services that are powered by this technology, the scheduling of commitments, and its potential impact on the modes of supply and the concept of technological neutrality. The second step, which involves a determination of whether the Member under challenge has undertaken any specific commitments with respect to the services at issue, consists in an assessment of whether the Member has violated any of its GATS obligations or commitments.[728] Under this step, the emergence of AI-powered services raises concerns, in particular, about the concept of 'likeness', and the application of disciplines on domestic regulation and services subsidies to measures that specifically target AI systems, including those employed in the services sector.[729] The third and last step concerns the potential invocation of exception clauses by WTO Members whose AI-specific measures are found to be in violation of their obligations and commitments under the GATS. In such cases, WTO adjudicators should determine whether the inconsistent measure may be indeed justified under the invoked exception(s) prescribed by the Agreement. While a few scholars have discussed the invocation of the Article XIV and XIV *bis* with respect to the implementation of data localisation requirements and other AI-related measures[730], it is unclear to what extent governments could invoke the same exceptions to justify the adoption of AI-specific policies.

5.3.1 AI and scope of application of the GATS

As regards the determination of whether AI-powered services and AI-specific policies fall under the scope of application of the GATS, three issues warrant particular attention: (i) the classification of AI-powered services and its impact on the scheduling

[727] AB Report, *Canada - Autos* (n 654) para 170.
[728] Zhang (n 63) 20; Meltzer (n 23) s40.
[729] It should be noted that, even in the absence of specific commitments, a Member may still need to comply with general obligations. Therefore, challenges may be brought against AI-specific measures even in the absence of specific commitments if these measures are deemed to allegedly violate GATS general obligations.
[730] Meltzer (n 23) s40; Ferracane (n 26); Mishra, 'International Trade Law Meets Data Ethics: A Brave New World' (n 35).

of commitments; (ii) the effect of AI on modes of supply; and (iii) the applicability of the concept of technological neutrality.

5.3.1.1 Services classification and scheduling of commitments

According to the Guidelines for the Scheduling of Specific Commitments[731], the classification of services sectors and sub-sectors should be based on the Secretariat's Services Sectoral Classification List.[732] Together with the first iteration of the Scheduling Guidelines[733], document W/120 was developed in the early 1990s for the express purpose of assisting the parties in the preparation of their offers (in the form of specific commitments) during the Uruguay Round.[734] It is based on the Provisional version of the Central Product Classification (CPC Prov.), which was developed by the UN in the early 1990s for statistical purposes.[735] Notably, with its 12 sectors and over 150 subsectors, document W/120 lays out a much more aggregate classification list than the one found in the CPC, which encompasses 10 Sections, 69 Divisions, 295 Groups, 1050 Classes and 1811 Sub-classes.[736] The Guidelines clarify that, where necessary, WTO Members may rely on other internationally recognised classification frameworks, besides the CPC, to further refine a sectoral classification.[737] Thus, WTO Members are not obliged to use document W/120 as a classification system. Nonetheless, during the Uruguay Round most WTO Members used the Provisional CPC

[731] WTO, Council for Trade in Services, 'Guidelines for the Scheduling of Specific Commitments under the GATS (28 March 2001)' S/L/92.
[732] WTO, 'Services Sectoral Classification List - Note by the Secretariat (10 July 1991)' MTN.GNS/W/120.
[733] Group of Negotiations on Services, 'Scheduling of Initial Commitments in Trade in Services: Explanatory Note, (Addendum of 30 November 1993)' MTN.GNS/W/164/Add.1; Group of Negotiations on Services, 'Scheduling of Initial Commitments in Trade in Services: Explanatory Note (3 September 1993)' MTN.GNS/W/164.
[734] AB Report, *US-Gambling* (n 64) para 204.
[735] Based on the nature of services, the CPC includes products that are the output of economic activity like services. Weber and Burri (n 623) 17–18; Statistical Office of the United Nations, 'Provisional Central Product Classification' (United Nations 1991) Statistical Papers Series M No. 77.
[736] AB Report, *US-Gambling* (n 64) para 200.
[737] Classification systems can be categorized as activity-based (e.g. International Standard Industrial Classification of all Economic Activities – ISIC), transaction-based (e.g. IMF Balance of Payments and International Investment Position Manual (BPM6), production-based (e.g. North American Industry Classification System – NAICS) and product-based (e.g. UN CPC). South Centre, 'Classification in Services: An Overview of the Main Issues for Developing Countries' (2005) SC/TADP/AN/SV/11 2.

as the basis for scheduling their commitments in nearly all sectors, and almost all acceding countries have followed suit since then.[738]

The increased role emerging technologies, including artificial intelligence, play in the digital economy, has drawn renewed attention on two issues: (i) the classification of services; and (ii) the scheduling of commitments. First, notwithstanding the technological developments that have occurred in the last 30 years, the Services Sectoral Classification List has remained untouched since the early 1990s. The CPC, on the other hand, has been updated twice to take into account technological progress.[739] According to the WTO Secretariat, the new versions of the CPC did not prejudge the commitments previously undertaken by Members in the context of the GATS.[740] Secondly, several GATS schedules suffer from ambiguity of commitments and lack of specificity, leading to problems in the classification of digital services.[741] This has led several scholars to argue that the two services classification systems WTO Members use for reference are partly outdated and not satisfactorily applicable to the realities of digital trade, as evidenced by the fact that digital services like search engines or automated decision-making systems are not explicitly found among the entries of either document W/120 or CPC Prov.[742]

Properly classifying services has significant and consequential implications for WTO members. As Zhang points out, by following a 'positive list' approach[743] the GATS

[738] ibid 3.
[739] United Nations, 'Central Product Classification (CPC) – Version 2.1' (2015) ST/ESA/STAT/SER.M/77/Ver.2.1 21.
[740] WTO, Committee on Specific Commitments, 'Report of the Meeting Held on 10 March 2021 - Note by the Secretariat (12 April 2021)' S/CSC/M/85 2.
[741] Rudolf Adlung and others, 'FOG in GATS Commitments – Why WTO Members Should Care' (2013) 12 World Trade Review 1.
[742] Weber and Burri (n 623) 60; Henry Gao, 'Google's China Problem: A Case Study on Trade, Technology and Human Rights under the GATS' (2011) 6 Asian Journal of WTO & International Health Law and Policy 349; CY Cyrus Chu and Po-Ching Lee, 'Three Changes Not Foreseen by WTO Rules Framers Twenty-Five Years Ago' (2019) 53 Journal of World Trade; Mavroidis (n 599) 242; Burri, 'Data Flows and Global Trade Law' (n 428) 18.
[743] A 'positive list' approach means that the scope of the commitments depends on what sectors and subsectors members list in their respective schedules of specific commitments, as well as on the limitations they inscribe under the respective market access, national treatment and additional commitments columns for these sectors and sub-sectors. On the other hand, a 'negative list' approach means that all services sectors are fully liberalised unless members indicate otherwise in their schedules. Geza Feketekuty, 'Assessing and Improving the Architecture of the GATS' in Pierre Sauvé and Robert M

enables each member to tailor its substantive commitments according to its domestic policy considerations and regulatory concerns, resulting in a variation in the scope of substantive obligations under the agreement from member to member.[744] This means that the operation of the GATS, and the scheduling of commitments in particular, requires services to be identified and classified, since each category implies different duties and flexibilities for WTO Members.[745]

Considering that AI was conceptualized decades before the creation of the WTO but found practical and commercial application only several years after the entry into force of the GATS, one may question whether this technology actually led to the creation of new services or whether it simply provides a variation of services that already existed in the early 1990s, when services were first identified and classified for negotiating purposes during the Uruguay Round.

Several scholars have debated about the ability of the GATS agreement to keep up with technological progress and whether new technologies like AI, blockchain, Internet of Things and cloud computing create new services that are not fully captured by the existing GATS classification. At the one end of the spectrum is the view that emerging technologies undermine the efficacy of the current GATS services classification system, rendering the classification issue an open question[746], with some scholars arguing that AI-embedded services can make it difficult to classify an item based on a fixed and formalistic basis.[747] At the opposite end of spectrum lies the view that all services, irrespective of the technology, are covered by the GATS, with some scholars claiming that the agreement applies also to digital services operating with AI systems[748], and that function matters more than technology.[749] This view is supported by the finding

Stern (eds), *GATS 2000: New Directions in Services Trade Liberalization* (Brookings Institution Press 2010) 97–98; Rudolf Adlung and Hamid Mamdouh, 'How to Design Trade Agreements in Services: Top Down or Bottom-Up?' (2014) 48 Journal of World Trade 191; Matsushita and others (n 642) 585.
[744] Zhang (n 63) 19.
[745] ibid 31; Burri, 'Data Flows and Global Trade Law' (n 428) 18.
[746] Burri, 'The International Economic Law Framework for Digital Trade' (n 276) 40–43; Mira Burri, 'Towards a New Treaty on Digital Trade' (2021) 55 Journal of World Trade 77.
[747] Liu, Han-Wei and Lin, Ching-Fu (n 33) 421.
[748] Irion and Williams (n 30) 19.
[749] Willemyns (n 25) 60.

of the AB in the *US – Gambling* case that document W/120 contains an exhaustive list of sectors, arguing that there are no services sectors for the purposes of entering commitments in the GATS that lie beyond those covered in the Services Sectoral Classification list.[750] Thus, adding to the existing list could only occur through a formal amendment of document W/120.[751]

WTO members have also expressed different opinions on the topic.[752] Recalling the principle of technological neutrality of the GATS, the European Union argued that there are new technologies and new ways to deliver a service, which could be linked to subsectors in the W/120 classification, rather than 'new' services.[753] Australia also opined that a new way of delivering services does not render services new, adding that if a service is not explicitly listed in the CPC it does not mean that one should automatically consider it a 'new' service.[754] China, on the other hand, argued that technological progress has led to the emergence of new services like cloud computing.[755] As the Chairman of the Committee on Specific Commitments (CSC) noted, the essential question underlying 'new services' is how a service should be classified and scheduled when it appears that the existing classification systems does not provide clear guidance.[756]

Notably, divergence among WTO Members extends beyond the existence of 'new services', with different views emerging on whether a definition of 'new services' is needed, and the implications of 'new services' for existing commitments.[757] More specifically, members are concerned about the issue of 'new services' because they

[750] AB Report, *US-Gambling* (n 64) para 172.
[751] Mavroidis (n 599) 352; Weber and Burri (n 623) 32.
[752] Meltzer (n 23) s39.
[753] Committee on Specific Commitments, 'Report of the Meeting Held on 14 October 2015 - Note by the Secretariat (27 November 2015)' S/CSC/M/74 6; Committee on Specific Commitments, 'Report of the Meeting Held on March 2017 - Note by the Secretariat (1 May 2017)' S/CSC/M/78 3.
[754] Australia based its argument on an informal note prepared by the WTO Secretariat (JOB/SERV/189) that provides an illustrative list of services without explicit reference in the Services Sectoral Classification List. This note is restricted to the public. Committee on Specific Commitments, 'Report of the Meeting Held on 18 March 2015 - Note by the Secretariat (2 April 2015)' S/CSC/M/72 3; Committee on Specific Commitments, 'Report of the Meeting Held on 18 September 2014 - Note by the Secretariat (15 October 2014)' S/CSC/M/71 3.
[755] Committee on Specific Commitments, 'WTO Doc. S/CSC/M/72' (n 754) 1,3.
[756] ibid 1.
[757] Committee on Specific Commitments, 'WTO Doc. S/CSC/M/71' (n 754) 5.

want to be reassured on the scope of the commitments they undertake, as several services that have emerged in the last two decades are not explicitly referred to in W/120 and the CPC.[758]

The GATS offers no definition of 'new services'.[759] A 1997 informal note by the Chairman of the CSC mentions three broad approaches to the problem of identifying and finding a new service.[760] First, a service that not yet listed in the CPC could be regarded as new, and no existing commitment could be held to cover such a service.[761] As neither document W/120 nor CPC Prov. explicitly refer to the term artificial intelligence or to AI applications (e.g. automated-decision making, image diagnostic, transport services provided by autonomous vehicles) one could argue that AI-powered services could be considered 'new services' and no existing commitment would cover them. However, as AI technology is often used in a wide variety of services that are already included in the Services Sectoral Classification List, because they serve the same function or end-use[762], the number of AI-powered services that could be considered genuinely 'new', rather than a variant of existing services, could be rather meagre. Moreover, following WTO jurisprudence, which considers document W/120 an exhaustive list, no service falls outside its scope.[763] Indeed, services that are not explicitly mentioned in the Services Sectoral Classification List could fall under the 'other' category present in most subsectors or the residual macro-category 'other services not included elsewhere'.[764] However, some scholars warn about the

[758] Zhang (n 63) 14–15.
[759] The only exception appears in the Understanding on Commitments in Financial services drafted in 1994 by the participants in the Uruguay Round. Establishing that "a member should permit financial service suppliers of any other member established in its territory to offer in its territory any new financial service", it defines 'new financial service' as a "service of a financial nature, including services related to existing and new products or the manner in which a product is delivered, that is not supplied by any financial service supplier in the territory of a particular member but which is supplied in the territory of another member. WTO, 'Understanding on Commitments in Financial Services (15 April 1994)' LT/UR/U/1.
[760] The relevant primary source is not available to the public. It is mentioned in Zhang (n 63) 15.
[761] ibid.
[762] Committee on Specific Commitments, 'WTO Doc. S/CSC/M/71' (n 754) 3; Zhang (n 63) 116.
[763] Committee on Specific Commitments, 'WTO Doc. S/CSC/M/78' (n 753) 3.
[764] ibid 2.

unintended consequences of excessively relying on the use of the 'other' services category to identify and classify services that emerge in the XXI century.[765]

Based on the second approach, a service could be considered to be new and not covered by an existing commitment if it had not previously been feasible because the necessary technology was not available.[766] One could argue that services powered by AI are unlikely to be considered 'new' under this approach because before 1991, when the Uruguay Round trade negotiators drew up the GATS Services Sectoral Classification List, some AI technologies (e.g. expert systems) had already found commercial application.[767] Therefore, the business community could have already considered AI-powered services as feasible at the time the GATS was negotiated. However, two factors may induce the reader to think otherwise. First, the expert system approach used for AI in the 1980s proved to be rather limited, leading the business community to lower expectations on the practical applications of AI.[768] Secondly, it is possible that, given how limited and recent the commercial application of AI was at the time of the Uruguay Round, the GATS negotiators may have not been aware of this technology and its potential disruptive impact on trade in services.

This second factor is relevant also for the analysis of the third approach, which focuses on services unforeseen at the time of commitments. According to it, even if the definition in the CPC covers the unforeseen service, it should not be considered as covered by the commitments.[769] AI had been first conceptualized in the 1950s, remaining largely a theoretical exercise until the proliferation of personal computers and mini-computers in the 1980s. Thus, one could argue that academics and at least a part of the business community may have already foreseen the application of AI in the services sector by the time the Uruguay Round negotiations commenced. However, it is unclear to what extent trade negotiators may have been aware of the technological advances in artificial intelligence and their implications for trade in services at the time

[765] Weber and Burri (n 623) 32.
[766] Zhang (n 63) 15.
[767] See Chapter 2, Section 2.4.
[768] See Chapter 2, Section 2.4.
[769] Zhang (n 63) 15.

GATS negotiations took place between the mid-1980s and the early 1990s. A comprehensive analysis of the GATS *travaux preparatoires*, which could help shed further light on this issue, falls outside the scope of this study and is left for future research.

As the GATS Services Sectoral Classification List is a WTO Secretariat internal document rather than an international treaty like the International Convention on the Harmonized Commodity Description and Coding System (HS Convention)[770], WTO adjudicators have discretion over whether to consult this document to interpret the schedules of commitments. WTO case law clarified that document W/120, the CPC, and the Scheduling Guidelines are supplementary means of interpretation within the meaning of Article 32 of the Vienna Convention on the Law of Treaties (VCLT).[771] The Panel in *China – Audiovisuals* clarified that "evidence on the technical feasibility or commercial reality of a service at the time of the service commitment may constitute circumstances relevant to the interpretation of its scope" under Article 32 of the VCLT.[772] WTO case law seems to suggest that schedules should be interpreted in an evolutionary manner, meaning that the interpretation of the ordinary meaning of services or words used to describe services should take into account potential technological progress.[773] Thus, it is possible that WTO adjudicators could use CPC ver. 2.1, within the meaning of Article 32 of the VCLT, to guide their interpretation of GATS schedules.

If AI is considered to be covered under the GATS classification system, there could be two options for classification. First, AI could be regarded as a standalone service classifiable as 'data processing services' (CPC 843) under computer and related services.[774] More specifically, since AI systems involve probabilistic analysis and the

[770] Mavroidis (n 599) 354.
[771] AB Report, *US-Gambling* (n 64) para 196; Panel Report, *Mexico — Measures Affecting Telecommunications Services,* WT/DS204/R, adopted on 1 June 2004 [7.66-7.67]; Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.923.
[772] Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.1237.
[773] AB Report, *China - Publications and Audiovisual Products* (n 64) para 412; Gabrielle Marceau, 'Evolutive Interpretation by the WTO Adjudicator' (2018) 21 Journal of International Economic Law 791, 804.
[774] Chander (n 32) 123.

processing of large quantities of data, AI could be classified as 'data processing and tabulation services' (CPC 84320), which include services such as data processing and tabulation services as well as computer calculating services.

However, in the Services Sectoral Classification List[775], CPC 843 appears both under computer and related services as well as under telecommunication services ('online information and/or data processing'). The Council for Trade in Services noted that "[g]iven the interplay between the two sectors' list of activities, it may not be clear when telecommunication services, computer services, or both are being supplied".[776] This could be a problem because the GATS classification is designed to be exclusionary, meaning that any given service should fall under only one category.[777] In this regard, the CPC indicated that when services could be classifiable under two or more categories, the category providing the most specific description is to be preferred to categories that provide a more general description and that composite services that consist of a combination of different services shall be classified as if they consisted of the service that gives them their essential character, in so far as this criterion is applicable, if they cannot be classified by reference to the above-mentioned specificity criterion.[778] For example, in the case at issue what gives AI its essential character is not the "transmission and reception of signals by any electromagnetic means"[779], but rather the mathematical computation and processing of data. Thus, based on this criterion, AI should be classified under computer services rather than telecommunication services.

In the alternative, distinguishing between use and supply may help resolve this classification issue: when telecommunications are simply used as a means of delivery for other services, the latter should be classified elsewhere in the GATS list (e.g. under computer services or audiovisual services) rather than under telecommunication

[775] WTO, 'WTO Doc. W/120' (n 658).
[776] WTO, Council for Trade in Services, 'Computer and Related Services - Background Note by the Secretariat (14 July 1998)' S/C/W/45 2.
[777] Chander (n 32) 123.
[778] Statistical Office of the United Nations (n 735) 15.
[779] GATS Annex on Telecommunications, Article 3(a)

services.[780] Razon argues that cloud computing and blockchain retain their computer services classification because they only use telecommunication services but do not supply them.[781] A similar reasoning could be applied to artificial intelligence.

On the other hand, if AI is not considered a standalone service but rather a component that powers or enables the supply of a service, then said service "shall be classified under the category appropriate to the services to which they are more akin".[782] For example, image diagnostic services powered by machine learning techniques should be classified under human health services (CPC 931) rather than data processing services because they are more similar to medical services than computer services. Likewise, automated decision-making for credit granting decisions should be classified under 'other credit granting services' (CPC 8113), a sub-category of financial services, rather than under 'data processing services' (CPC 843).[783]

5.3.1.2 Modes of supply

Questions may arise as to whether artificial intelligence changes the way services are supplied. Is there a need to introduce a new mode of supply or to update the four already in existence for the purpose of properly capturing the supply of services powered by artificial intelligence?

The answer may depend on several factors, including time, services sector, mode of supply and the 'resilience' of the principle of technological neutrality. Bearing in mind that this research operates under the assumption that the only type of AI technology currently available can be best described as 'weak AI'[784], in the short term three different scenarios could materialise. Under the first scenario the use of AI merely leads to a change in the means of supply (i.e., the way a service is delivered) rather

[780] WTO, Council for Trade in Services, 'Telecommunication Services - Background Note by the Secretariat (10 June 2009)' S/C/W/299 4.
[781] Arvin Kristopher Razon, 'Liberalising Blockchain: An Application of the GATS Digital Trade Framework' (2019) 20 Melbourne Journal of International Law 125, 144.
[782] Statistical Office of the United Nations (n 735) 15.
[783] Image diagnostic services could also be considered more specific than data processing services, thus fulfilling the first criterion regarding the specificity of the service at issue. Chander (n 32) 124.
[784] See Chapter 2, Section 2.3.1.

than a change in mode of supply.[785] For example, companies supplying financial services that make use of AI technology (e.g., fintech), would still supply their services through mode 1, 2, 3 and 4, with AI systems simply being employed to predict certain outcomes.

Under the second scenario, the use of artificial intelligence may lead to a shift in the mode through which a service is supplied within the existing modes. AI was developed with the idea of creating machines that could replicate human behaviour and perform tasks usually undertaken by human beings. As progress in the AI field advances at rapid pace, it is possible that some services usually provided by natural persons, like accounting or translation services, could be performed by AI machines. Consequently, if the latter were to replace humans in the performance of certain jobs, this could lead to a shift in the preferred mode through which services are supplied. Case in point are interpretation services, which can be supplied through all four different modes of supply. If a company uses AI technologies (e.g., NLP) to provide live interpretation from the territory of the supplier into the territory of the consumer without the need for a natural person to cross the border to supply such service, it is likely that the company would prefer to supply the service through mode 1 rather than mode 4. From a policy perspective, this potential shift in mode of supply could have significant consequences, because mode 4 is among the least liberalized modes of supply and the mode for which numerous developing and least developed countries (LDCs) have long attempted to negotiate, often unsuccessfully, greater market access in developed economies.[786] If AI leads to a decrease in the use of mode 4 to supply services, interest in negotiating progressive liberalization under this mode might fade, to the detriment of those countries, especially small developing countries and LDCs, that would continue to rely on mode 4 to supply their services because they do not have the digital capacity to compete with foreign suppliers of AI-powered services.

[785] Mavroidis (n 599) 237.
[786] Juan A Marchetti, 'Developing Countries in the WTO Services Negotiations' (2004) WTO Staff Working Paper No. ERSD-2004-06.

The third short-term scenario rests on the idea that AI could change how services are supplied to the point that a new mode of supply may emerge. For example, autonomous vehicles could be considered as providing road transport services. Rather than a mere tool that a person can use to move from point A to point B, under this scenario the self-driving car is to be considered as a combination of a physical product (i.e., the vehicle) and a driver (i.e., the AI system embedded in the car) offering a road transport service (e.g. taxi services), with the latter providing the highest value to the vehicle then the physical structure itself. For this type of situation, when the service is not exported directly but is rather embodied in a manufacturing good, Cernat, Kutlina-Dimitrova and Foltea argue in favour of introducing a new mode of supply (mode 5).[787] In this scenario one could argue that, in the absence of an amendment of Article I:2 of the GATS to include a potential mode 5 in the definition of 'trade in services', the applicability of GATS disciplines to the supply of the service described above would be uncertain.[788] On the other hand, it is likely that the involvement of a physical medium (e.g. the car) would imply the applicability of GATT rules.[789]

Although uncertainty surrounds predictions on the ability of AI innovation to lead to a shift towards AGI, this research finds it useful to consider also a long-term (highly hypothetical) scenario where AI systems take the form of human-like entities that can perform tasks in lieu humans and supply a service in lieu of natural persons. In the far-fetched scenario that a company were to send a humanoid from its territory into the territory of another WTO member to supply a service there seem to be no mode of supply that would cover this instance. Indeed, Article XXVIII(k) of the GATS defines a 'natural person of another member' as "the natural person who resides in the territory of that other Member or any other Member, and who under the law of that other Member: (i) is a national of that other member; or (ii) has the right of permanent residence in that other member". Therefore, as mode 4 covers only the movement of

[787] Lucien Cernat and Kutlina-Dimitrova Zornitsa, 'Thinking in a Box: A "Mode 5" Approach to Service Trade' (2014) 48 Journal of World Trade 1109; Marina Foltea, 'How to Include 'Mode 5' Services Commitments in Bilateral Free Trade Agreements and at Multilateral Stage?' (European Parliament, Directorate General for External Policies, Policy Department 2018) EP/EXPO/B/INTA/2018/02.
[788] See discussion on the scope of application of the GATS to 'measures affecting trade in services' under Section 5.2.1.
[789] Liu, Han-Wei and Lin, Ching-Fu (n 33) 425; Fleuter (n 25) 156.

natural persons, entities that are similar to humans are unlikely not fall under the definition provided by Article XXVIII(k) of the GATS. It follows that AI machines that move from the territory of one Member to the territory of another Member to supply a service would not be covered under any of the existing four modes of supply.[790] Consequently, measures affecting this type of service supply would fall outside the scope of application of the GATS.

Two options could be considered to ensure that the Agreement covers situations where a service may be provided through the movement of entities other than natural persons. Members could amend the definition of mode 4 to include language that refers to AGI entities (e.g., humanoids, robots, AI systems). This would be in line with the idea that AI machines should have some form of legal personhood and be considered liable for their actions.[791] The other option would be to amend the Agreement to include an entirely different mode of supply (e.g., 'Movement of AI machines' (mode 4bis)). However, considering the recent stall in the multilateral trade negotiations under the Doha Development Round and the lack of consensus over the negotiation of plurilateral rules on electronic commerce currently underway at the WTO, it seems unlikely that the WTO Members would agree to modify the text of the GATS to prepare for a scenario that seems rather unlikely and far-fetched.[792] Nonetheless, the pace at which technological progress is advancing forces to consider that AI may

[790] Liu and Lin reached a similar conclusion in their discussion on automated legal advice tools (ALATs) and ROSS Intelligence, "a leading AI-powered program that uses natural language processing to conduct legal research and document review on American Laws", whose founders describe as an 'AI lawyer'. Liu, Han-Wei and Lin, Ching-Fu (n 33) 421–425.

[791] Resolution of 16 Feb. 2017 with Recommendations to the Commission on Civil Law Rules on Robotics, Eur. Parl. Doc. (2015/2103(INL)) ¶ 59(f) (2017); Gerhard Wagner, 'Robot, Inc.: Personhood for Autonomous Systems?' (2019) 88 Fordham Law Review 591; Robert van den Hoven van Genderen, 'Do We Need New Legal Personhood in the Age of Robots and AI?' in Marcelo Corrales, Mark Fenwick and Nikolaus Forgó (eds), *Robotics, AI and the Future of Law* (Springer 2018).

[792] Yet, the recent 'arrest' of Ai-DA, the world's first ultra-realistic robot artist, on spy charges by Egyptian authorities seems to suggest that a scenario where humanoids replace humans in the provision of certain services (e.g. entertainment or cultural services, in the case of Ai-DA) may not be so far-fetched after all. Luigi Ippolito, 'Ai-Da, l'artista robot inglese arrestata al Cairo come «spia»' *Corriere della Sera* (21 October 2021) <https://www.corriere.it/esteri/21_ottobre_21/ai-da-l-artista-robot-inglese-arrestata-cairo-come-spia-0c5b1d06-32aa-11ec-ae69-6ee9c02f57eb.shtml> accessed 6 December 2021; Nadia Khomami, Nadia Khomami Arts and culture correspondent, 'Egypt Detains Artist Robot Ai-Da before Historic Pyramid Show' *The Guardian* (20 October 2021) <https://www.theguardian.com/world/2021/oct/20/egypt-detains-artist-robot-ai-da-before-historic-pyramid-show> accessed 6 December 2021.

develop in the future in a way that could create potential new modes of supply of a service that are not covered under the existing GATS Framework.

5.3.1.3 AI and the principle of technological neutrality

According to several scholars, the GATS agreement rests on the principle of 'technological neutrality', which holds that GATS commitments apply to services supplied through any means of delivery/available technology, unless otherwise specified in a Member's schedule.[793] This principle implies that "online versions of a service be tested under the same legal regime as the offline version of that service".[794]

Still, the term 'technological neutrality' appears nowhere in the text of the GATS, its Annexes, or the Schedules of Specific Commitments. There is no GATS provision that specifically and explicitly refers to it. Actually, the origins of the term 'technological neutrality' in the trade in services framework date back to a 1997 Note by the Chairman of the Group on Basic Telecommunication on the scheduling of commitments, which first mentioned it.[795] Technological neutrality was later espoused by the CTS in a Progress Report to the General Council on the Work Programme on Electronic Commerce, although some Members viewed it, together with the electronic delivery of services, as complex issues that needed further examination.[796]

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[793] Baker and others (n 25) 10; Dan Ciuriak, 'Do WTO Commitments Remain Tenable in the Age of Data? Renegotiating the Rules-Based System for the Data-Driven Economy' (2021) (Published as 'The Challenge of Updating Institutions for Digital Trade,' Opinion, Centre for International Governance Innovation, 16 July 2021) 6 <https://papers.ssrn.com/abstract=3879150> accessed 8 October 2021; Panos Delimatsis, 'GATS Basics - Revisiting Some Basic Notions and Concepts of the General Agreement on Trade in Services' (Tilburg Law School 2018) Research Paper N. 1/2018 14; Fleuter (n 25) 167; Gao, 'Regulation of Digital Trade in US Free Trade Agreements: From Trade Regulation to Digital Regulation' (n 276) 61; Andrew T Guzman and Joost Pauwelyn, *International Trade Law* (2nd edn, Wolters Kluwer Law & Business 2012); Willemyns (n 25) 63.

[794] Anupam Chander, 'Trade 2.0' (2009) 34 Yale Journal of International Law 281, 298.

[795] "Unless otherwise noted in the sector column, any basic telecom service listed in the sector column: […] (c) may be provided through any means of technology (e.g., cable1, wireless, satellites)". See Group on Basic Telecommunications, 'Notes on Scheduling Basic Telecom Services Commitments - Note by the Chairman (16 January 1997)' S/GBT/W/2/Rev.1 para 1(c).

[796] "The Agreement applies to all services regardless of the means by which they are delivered". See WTO, Council for Trade in Services, 'WTO Doc. S/L/74' (n 671) para 4; Gabriele Gagliani, 'Cybersecurity, Technological Neutrality, and International Trade Law' (2020) 23 Journal of International Economic Law 723, 733.

While some scholars argue that Panels and the AB have yet to clarify the exact standing and implications of technological neutrality[797], WTO adjudicators have reaffirmed its application in the trade in services field. The Panel in *US – Gambling* stated that, in line with the principle of technological neutrality - which the panelists argued was largely shared among WTO Members - the cross-border supply of services (mode 1) encompasses all means of delivery, including the Internet, unless otherwise specified in a Member's schedule.[798] Thus, technological neutrality can be understood as referring to the means of supplying a service within a certain mode, with its relevance not confined to mode 1.[799] The use of the terms 'including' by the Panel in *US – Gambling* suggests that mode 1 could cover also other means or technologies used to deliver services not expressly mentioned, such as artificial intelligence.

Abiding by the principle of technological neutrality offers Members some form of protection against the erosion of their commitments over time, supports the operation of the WTO system without frequent renegotiation, and provides 'certainty' for transnational business activity.[800] However, a minority of scholars have recently started to question the assumption that this principle is well established in international trade law, contending that its application to fast-paced technological developments raises numerous concerns.[801] For example, Streinz suggests that there may be need to reconsider the principle of technological neutrality when new technologies transform the economy fundamentally, citing the temporal mismatch between long lasting obligations under international economic law and the rapid pace of technological development in the digital economy.[802] Gagliani notes that, by requiring for provisions to apply to all technologies indistinctively, regardless of any technological change, technological neutrality principle has the potential of expanding the scope of existing

[797] Gagliani (n 796) 733.
[798] Panel Report, *US-Gambling* (n 680) para 6.285. See also Gao, 'Regulation of Digital Trade in US Free Trade Agreements: From Trade Regulation to Digital Regulation' (n 276) 61.
[799] Mavroidis (n 599) 208, 211.
[800] Streinz (n 35) 174–175; Shin-Yi Peng, 'Renegotiate the WTO Schedules of Commitments: Technological Development and Treaty Interpretation' (2012) 45 Cornell International Law Journal 403, 427–429; Ciuriak (n 793) 6.
[801] Gagliani (n 796) 743; Streinz (n 35) 168.
[802] Streinz (n 35) 174–175.

technology-related trade obligations.[803] He adds that by excluding that different technologies may require different treatment, this principles assumes the legitimacy and suitability of old laws regulating new technologies.[804] Mavroidis, on the other hand, warns that assigning prospective value to technological neutrality has problematic implications, as a decision by WTO adjudicators becomes a substitute for a negotiation that could have taken place.[805]

As the use of artificial intelligence becomes more widespread and governments pour increased funding into the development of this technology, the applicability of the principle of technological neutrality may be put under unexpected pressure. The nature and magnitude of advances in AI innovation could be such that abiding to this principle would entail stretching commitments way beyond the prediction and intention of those that inscribed them. This is turn may have three consequences. First, it could affect Members' compliance with trade obligations, since the more unclear the effect of technological development is, the more uncertain countries become about the actual scope of the obligations and commitments they undertake.[806] Secondly, it could reduce the policy space Members have to regulate AI, by limiting their ability to address and mitigate the risks associated with the use of this technology. Third, it could incentivize Members to frequently invoke exceptions, which Gagliani argues could have disrupting effects for the multilateral trading system.[807]

In the face of further projected developments in the AI field WTO Members could choose between two different approaches. On the one hand, they could leave it to WTO adjudicators to decide to which extent their commitments cover AI-powered services. However, as Panels and the AB have showed an inclination to adopt an evolutionary interpretation approach founded on the principle of technology neutrality, relying on this option alone might lead to an undesirable extension of the scope of a Member's commitments. Considering that some countries have recently criticized WTO

[803] Gagliani (n 796) 723–724.
[804] ibid 732; Brad A Greenberg, 'Rethinking Technology Neutrality' (2016) 100 Minnesota Law Review 1495, 1522.
[805] Mavroidis (n 599) 358.
[806] Gagliani (n 796) 738.
[807] ibid 742.

adjudicators for a perceived 'judicial overreach'[808], the feasibility and suitability of this approach is questionable. On the other hand, WTO Members could take a more pro-active approach, renegotiating commitments and offering compensation to their affected trading partners as per Article XXI of the GATS.[809] However, as Tuthill points out, procedures to renegotiate commitments are arduous and, as such, are likely to be considered a last resort.[810]

5.3.2 Determination of Consistency with GATS Obligations and Commitments: potential issues

This section aims to highlight some of the most crucial issues surrounding the determination of consistency of AI-specific policies with GATS obligations and commitments. More specifically, its key purpose is to call attention to certain areas of analysis and issues that may lie at the core of potential WTO disputes involving AI-specific policies adopted by any WTO Member. Acknowledging that additional topics of concerns or problems may emerge or become relevant depending on the case at issue, a more detailed and systematic assessment of specific violations of Article II:1, Article VI, Article XVI and Article XVII of the GATS is left for future research.

5.3.2.1 Determination of likeness

Measures adopted by WTO members to promote the use of artificial intelligence or mitigate the risks associated with it could be found to be inconsistent with the MFN obligation if they do not "accord immediately and unconditionally to services and service suppliers of any other Member treatment no less favourable than that it accords to like services and service suppliers of any other country" (Article II:1). It is also possible that AI-specific policies adopted by WTO Members in sectors they inscribed in their GATS schedules could be found in violation of the NT obligation if the Member accords to services and service suppliers of any other member, and in respect to all

[808] Gao and Zhou (n 80).
[809] Article XXI of the GATS establishes that a Member may modify or withdraw any commitment in its Schedule, at any time after three years have elapsed from the date on which that commitment entered into force, and enter into negotiations with a view to reaching agreement on any necessary compensatory adjustment with any Member affected by said modifications or withdrawal.
[810] Lee Tuthill, 'The GATS and New Rules for Regulators' (1997) 21 Telecommunications Policy 783, 786.

measures affecting the supply of services, treatment less favourable than that it accords to its own like services and service suppliers (Article XVII:1).

According to WTO jurisprudence, the determination of 'likeness' is crucial to the analysis of consistency of a measure with the MFN and national treatment obligations under the GATS. Indeed, the second step in the three-pronged test identified by the AB in *Canada – Autos* for the examination of claims based on Article II:1 of the GATS consists in establishing that the relevant 'services and service suppliers' are 'like' services and services suppliers of any other country.[811] Likewise, the three-part test identified by the Panel in *China – Publications and Audiovisual Products* and *China – Electronic Payment Services* for the examination of the consistency with Article XVII:1 of the GATS includes an examination of whether the foreign services and service suppliers are 'like' domestic services and service suppliers.[812] If WTO adjudicators find that the likeness test was not met, the measure at issue would not be found to be inconsistent with the GATS agreement. In other words, in a dispute alleging violation of Article II:1 or Article XVII:1 of the GATS by an AI-specific measure, a determination that AI-powered services and AI services suppliers are not 'like' non-AI-powered services and services suppliers means that the responding government may continue to maintain its discriminatory AI-specific measure.

However, under the current approach to likeness determination and considering the complexity of AI, WTO adjudicators may find it difficult to properly assess whether AI-powered services are like non-AI-powered services and whether AI suppliers are like non-AI suppliers. The agreement does not specify what the terms 'like services' and 'like services suppliers' mean under Article II:1 or Article XVII:1 of the GATS. Relevant case law indicates that the determination of likeness of services and service suppliers

[811] The three-pronged test consists of: (i) a determination under Article I:1 that the measure is covered by the GATS; (ii) a determination of likeness between the services and services suppliers at issue and those of any other country; and (iii) a determination of whether the treatment by one Member of services and service suppliers of any other Members is treatment no less favourable. AB Report, *Canada - Autos* (n 654) paras 170–171; Matsushita and others (n 642) 568.
[812] Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.1272; Panel Report, *China — Electronic Payment Services* (n 683) para 7.641; Van den Bossche and Zdouc (n 647) 406.

under either article should be made on a case-by-case basis.[813] Drawing from GATT jurisprudence, Panels and the AB could use, to a certain extent, the properties, nature and quality of the product, its end-uses, consumers tastes and habits, and the HS product classification as criteria for the determination of likeness in the context of the GATS, since no equivalent benchmark exists in services.[814] However, the AB clarified that these are simply "tools to assist in the task of sorting and examining the relevant evidence [and that t]hey are neither a treaty-mandated nor a closed list of criteria that will determine the legal characterization of products".[815]

The applicability of the four criteria to the determination of likeness between AI-powered services and services that do not use AI is somewhat problematic. First, the classification system criterion appears unable to fully capture the differences and similarities between these two types of services. For example, are financial services powered by AI like traditional financial services? If the former fall under the same category in the W/120 and CPC classification systems than the latter, one could argue that they are like services. However, as discussed in Section 5.3.1.1., the classification of AI-powered services is a contentious and unresolved issue. Moreover, contrary to the mandatory use of the harmonized system for tariff classification under the GATT agreement, the Scheduling Guidelines do not oblige WTO members to use document W/120 or CPC services classification frameworks to define the services where they want to undertake commitments, diminishing the usefulness of these documents for comparing the likeness of services transactions.[816]

The product characteristics criterion is harder to use in the context of services because the intangibility of services could make it more difficult to determine whether services that are powered by artificial intelligence are like services that do not use that

[813] AB Report, *Argentina - Financial Services* (n 668) para 6.25-6.26; Panel Report, *China — Electronic Payment Services* (n 683) para 7.701, 7.705.
[814] Appellate Body Report, *Japan – Taxes on Alcoholic Beverages*, WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R, adopted on 1 November 1996 [20]; Appellate Body Report, *European Communities — Measures Affecting Asbestos and Asbestos-Containing Products*, WT/DS135/AB/R, adopted on 5 April 2001 [101]; Cossy (n 689) 354; Matsushita and others (n 642) 568, 606.
[815] AB Report, *EC - Asbestos* (n 814) para 102.
[816] Cossy (n 689) 334.

technology.[817] Is the fact that there is a computer that autonomously makes decisions enough to claim that this is different from a traditional or non-AI service? Are there specific characteristics of artificial intelligence that will make a service this is powered by this technology not only different from a traditional service but also a digital service that is not powered by the same technology? Are services powered by different types of AI technology or different AI systems 'like services'?

It is likely that end-uses and consumer tastes are the most useful criteria among the four that could be used to determine likeness between services that are powered by AI technology and those that are not. Both are good indicators of a competitive relationship, allowing to determine whether two products are substitutable in a given market.[818] If the two services under consideration have the same function they can be consider as 'like'. For example, under the end-uses criterion, translating text using AI (e.g., using NLP techniques) could be considered 'like' translating text using human skills, as both services serve the same purpose: converting text from one language to another to convey information. Likewise, if using an autonomous vehicle to transport passengers from point A to point B against payment serves the same purpose of a service provided by a taxi driver, then the former could be considered a service 'like' taxi services.

Under the consumers' tastes criterion, two services would be considered to be 'like' if consumers in a given market consider them to be substitutable and are, thus, in a competitive relationship.[819] One could argue that there may be some resistance by consumers in trusting how AI machines work, and how they reach their decisions or predictions. Therefore, if consumers find AI-powered services less preferable than non-AI-powered services then the two services may not be considered 'like services'.[820]

Issues with the determination of likeness may arise also with respect to services suppliers. According to the Panel in *EC – Bananas III*, to the extent that two entities

[817] ibid 336.
[818] ibid 338.
[819] ibid.
[820] On the influence that consumers' habits may have on the determination of likeness, see AB Report, *EC - Asbestos* (n 814) paras 120–126.

provide like services, they are like service suppliers.[821] Therefore, determining the likeness of services could be enough to determine likeness of services suppliers. However, some scholars suggest that, even if two suppliers provide 'like services', they may not necessarily be 'like service suppliers'.[822] This seems especially true in the case of AI. For example, if an AI system provided a service that is like that supplied by a natural person (e.g., translation services), it may be difficult to consider these two types of suppliers to be 'like' both under the physical characteristics and consumer tastes criteria. However, taking into consideration that that the four criteria for likeness are primarily relevant for comparing services, rather than service suppliers, and that in some sectors it may be difficult to establish a clear distinction between the supplier and the service, especially from the perspective of consumers' habits[823], some parties in WTO disputes suggested other criteria to determine likeness of service suppliers (e.g. business model, size, sales volumes, equipment, and type of personnel employed), a proposal rejected by Panels.[824]

Likewise, regulation was discarded as a potential likeness criterion. When a measure provides for a distinction based exclusively on the origin of a service there is a presumption of likeness.[825] However, in case of *de facto* discrimination, where a difference in treatment is not exclusively linked to the origin of service suppliers, but to other factors, WTO adjudicators are required to determine whether services suppliers are like.[826] As the determination of likeness under Article II:1 and Article XVII:1 involves consideration of both the service and service suppliers, determining whether a distinction is based exclusively on origin or not may be more complex, "due to the role that domestic regulation may play in shaping, for example the characteristics of service and service suppliers and consumer preferences".[827] Some scholars argue that regulation should be considered for the determination of

[821] Panel Report, *EU - Bananas III* (n 668) para 7.322.
[822] Mavroidis (n 599) 299.
[823] Cossy (n 689) 337–339.
[824] ibid; Panel Report, *US-Gambling* (n 680) para 3.154; Panel Report, *Canada - Autos* (n 668) 10.284-10.285; Panel Report, *EU - Bananas III* (n 668) 4.677.
[825] AB Report, *Argentina - Financial Services* (n 668) para 6.61.
[826] Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.975.
[827] AB Report, *Argentina - Financial Services* (n 668) para 6.39.

likeness.[828] Mavroidis suggests that regulated services and service suppliers should be tested for likeness using policy and likeness, whereas the CPC classification should be used for unregulated services and service suppliers.[829] This can be particularly relevant in the case of artificial intelligence because governments are moving towards adopting national policies that may influence the perception that consumers have with regards to services and service suppliers that use AI technologies and are determining how AI should be employed in the economy across all sectors, including services. It should be noted, however, that the AB rejected regulatory concerns as criteria for determining likeness, by discarding the aims and affects test for the GATS in *EC-Bananas III*.[830]

5.3.2.2 Domestic regulation

On the most important debates in the context of the GATS is the relationship between the agreement and domestic regulatory autonomy.[831] As AI becomes increasingly widespread, questions arise about the potential limits that existing rules on domestic regulation under Article VI of the GATS may place on AI governance efforts and, in particular, on the development of AI-specific standards and technical requirements that regulate how AI-powered services must be supplied or their quality. More specifically, it is unclear to what extent AI-specific domestic regulation falls under the scope of application of the GATS and what disciplines contained in Article VI matter for the regulation of AI.

Contrary to the TBT Agreement, the GATS offers no distinction between a standard and a technical regulation. The Agreement only refers to the term 'technical standards' in Article VI:4 and VI:5, without providing a definition.[832] However, in the negotiations of the disciplines on domestic regulation in the accountancy sector some Members suggested that technical standards could be understood as "criteria or rules specifying the characteristics of the service […], as well as the manner in which it should be

[828] Mavroidis (n 599) 297; Cossy (n 689) 354–355.
[829] Mavroidis (n 599) 301.
[830] AB Report, *EC - Bananas III* (n 422) para 241.
[831] Krajewski (n 51) 411.
[832] WTO, Working Party on Domestic Regulation, 'Technical Standards in Services - Note by the Secretariat (13 September 2012)' S/WPDR/W/49 6.

performed" [833] or "requirements which may apply both to the characteristics or definition of the service itself into the manner in which it is performed".[834] The WTO Secretariat also noted that the ISO/IEC guide in 2004 stated that 'services standards' are standards that specify requirements to be fulfilled by a service, to establish the fitness for purpose, which is the ability of the given service to serve a defined purpose under specific conditions.[835] According to the European Committee for Standardisation, 'fitness for purpose' may relate to his ability, compatibility, interoperability, trade, but also refer to the protection of non-economic values like those related to health safety or the environment.[836] Although studies on services standardizations are limited, available surveys suggest that the most common areas for existing service sector standards include terminology, quality management, safety management, and ethical standards.[837] The WTO Secretariat found that many technical standards in services relate to performance and process, specifying the manner by which the service is to be produced or supplied (e.g. protocols followed, the actual conditions under which the services to be performed, as well as the equipment/technology which is to be utilized), and that sometimes these process-related standards also specify the public health safety and environmental conditions that are to be met with a view to systematically and consistently improve the quality of the service delivered and to assist service suppliers to meet legislative or regulatory requirements.[838] In particular, some performance and/or process standards are primarily concerned with ensuring that the service meets minimum health, safety and environmental requirements, making sure that, by adopting proper precautions defined by the standard, the service supplier is in effect reducing the risks faced by the consumer.[839] To the extent that

[833] ibid 6–7.
[834] WTO, Working Party on Professional Services, 'The Relevance of the Disciplines of the Agreement on Technical Barriers to Trade (TBT) and on Import Licensing Procedures to Article VI.4 of the General Agreement on Trade in Services (11 September 1996)' S/WPPS/W/9 3.
[835] WTO, Working Party on Domestic Regulation (n 832) 3.
[836] CEN Guide 15:2012, 'Guidance Document for the Development of Service Standards (1 February 2012)' para 2.14 et seq; Panagiotis Delimatsis, 'Standard-Setting in Services: New Frontiers in Rule-Making and the Role of the EU' in Pierre Sauvé and Martin Roy (eds), *Research Handbook on Trade in Services* (Edward Elgar Publishing 2016).
[837] Technopolis Group, 'Mapping Services Standardisation in Europe, Final Report to the Danish Enterprise and Construction Authority' (2010).
[838] WTO, Working Party on Domestic Regulation (n 832) 12.
[839] ibid 13.

they apply to the services sector and establish criteria on how AI systems should perform in the supply of a service, the standards and technical regulations on artificial intelligence currently developed by governments, including those addressing ethical issues related to privacy, safety, transparency, and non-discrimination, could be considered as 'technical standards', thus falling under the purview of Article VI:4 and VI:5 of the GATS.

While the TBT Agreement defines standards as voluntary and technical regulations as mandatory[840], with different sets of obligations on WTO Members attached to each of them, no such distinction exists in the GATS.[841] However, observing that standards are generally voluntary, the WTO Secretariat clarifies that a standard becomes mandatory – and only within the relevant jurisdiction – by incorporation or reference in a relevant act or rule.[842] According to it, standards - voluntary or otherwise - could fall within the scope of the GATS as long as they meet the criteria specified in Article I of the GATS.[843] Therefore, a voluntary AI-specific standard could fall within the scope of application of the Agreement if it is found to be a measure by a WTO Member that affects trade in services. Notably, only standards created by central, regional, or local governments and authorities or by non-governmental bodies that exercise powers delegated by central, regional, or local governments or authorities would fall under the scope of application of the GATS. This means that, for instance, all AI standards developed by private companies in a WTO Member country would fall outside the scope of application of the GATS unless the government made them mandatory by law.[844]

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[840] The TBT Agreement is a specialized agreement applicable to 'technical regulations', 'standards' and 'conformity assessment procedures' in trade in goods. Annex 1 of the defines technical regulation as a "[d]ocument which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory". A standard is, instead, a "[d]ocument approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory". Annex 1 clarifies that both technical regulations and standards may also "include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method".

[841] WTO, Working Party on Domestic Regulation (n 832) 8.

[842] ibid 5.

[843] ibid 8.

[844] Gabriel Gari, 'Is the WTO's Approach to International Standards on Services Outdated?' (2016) 19 Journal of International Economic Law 589, 603–604.

To the extent that AI-standards can be considered 'technical standards' under Article VI of the GATS, WTO Members are required to comply with the conditions set in Article VI:1, 2, 3, 6 and, pending the fulfilment of the negotiating mandate of Article VI:4, in Article VI:5. The latter, in particular, establishes that, in sectors where specific commitments were undertaken, Members must refrain from applying licensing and qualification requirements and technical standards that: (i) are not based on objective and transparent criteria; (ii) are more burdensome than necessary to ensure the quality of the service; (iii) are in themselves a restriction on the supply of the service (in the case of licensing procedures); and (iv) could not reasonably have been expected of that Member at the time the specific commitments in those sectors were made. As the WTO Secretariat points out "unless aligned according to an international standard, there may be numerous national differences in the technical standards adopted by countries, which can make the recognition of services or the identification of correspondence services between jurisdictions a real challenge".[845] It is for these reasons that Article VI:5(b) of the GATS clarifies that, in determining whether a member is in conformity with the criteria set out in Article VI:4, Members shall take into account international standards of relevant international organizations - defined "as international bodies whose membership is open to the relevant bodies of at least all Members of the WTO"[846] - applied by that Member.

From an AI governance perspective, Article VI:5 may appear to impose some stringent restrictions on a government's ability to design and implement AI-specific technical standards in the services sector, as evidenced by the necessity test, which requires that these measures contribute to the objective at issue (i.e. ensuring the quality of the service) and that no alternative measure which would have a similar effect is reasonably available.[847] However, three issues should be taken into account when assessing the potential strength of the limitations on AI governance posed by this provision. First, since Article VI:5 (as well as Article VI:1) applies only to sectors where specific commitments were undertaken, governments retain ample regulatory

[845] WTO, Working Party on Domestic Regulation (n 832) 7.
[846] Article VI:5(b), footnote 3.
[847] Krajewski (n 51) 414–415.

autonomy in uncommitted sectors. Indeed, as the GATS is about negative integration, it does not impose any obligation regarding the quality of the regulatory intervention in areas where no specific commitments have been entered.[848] Therefore, governments are free to introduce AI-specific measures that do not fulfil the conditions set out in Article VI:5 of the GATS – and Article VI:1 – in sectors where they did not undertake specific commitments. Considering how challenging it is to classify AI-powered services, determining whether a WTO Member has undertaken commitments in AI-powered services, which would trigger compliance with Article VI:1 and Article VI:5, is unlikely to be a straightforward exercise.

Secondly, Article VI:5(b) is not like Article 2.4 of the TBT agreement[849] because it does not require that international standards be followed, as it simply obliges a member to take them into account.[850] It does not amount to a full, positive obligation to base domestic regulations on international standards.[851] Krajewski goes even further by arguing that the passive wording of Article VI:5(b) ('account shall be taken') could also be understood as an interpretive guideline for WTO adjudicators rather than a requirement for WTO Members to actively take international standards into account when applying domestic regulation.[852] But, if a WTO member decides to follow international standards it is not clear whether there is a presumption that the regulation meets the necessary requirements, akin to Article 2.5 of the TBT Agreement[853], because the GATS is silent on this point.[854] According to Krajewski Article VI:5(b) of the GATS seems to suggest that the necessity of a domestic

[848] Mavroidis (n 599) 266.
[849] Article 2.4 of the TBT Agreement establishes that "[w]here technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems".
[850] Mavroidis (n 599) 280.
[851] Krajewski (n 51) 425.
[852] ibid.
[853] Article 2.5 of the TBT Agreements reads: "Whenever a technical regulation is prepared, adopted or applied for one of the legitimate objectives explicitly mentioned in paragraph 2, and is in accordance with relevant international standards, it shall be rebuttably presumed not to create an unnecessary obstacle to international trade".
[854] Mavroidis (n 599) 280.

regulation has to be established without taking international standards into account, unless a Member has actually applied them.[855] Article VI:5 GATS leaves national regulators with a greater margin of discretion than obligations in the TBT agreement, which introduces elements of regulatory harmonization into WTO law and greatly reduces national regulatory autonomy by requiring members to comply with international standards.[856] Thus, Article VI:5 of the GATS does not mandate governments to follow international standards on AI developed by international standardising bodies like ISO or IEC, leaving them with greater space of manoeuvre to develop national AI-specific standards in services than in the realm of goods.

Lastly, concerns may arise about the applicability of Article VI:5(a)(ii) to AI-specific domestic regulation, especially with regards to commitments undertaken by WTO Members that acceded to the WTO before the 2010s. Indeed, it is unclear whether trade negotiators in the 1990s and early 2000s were aware of advances in AI at the time specific commitments were inscribed in the GATS schedules, and therefore to what extent they could not reasonably have expected governments to introduce AI-specific measures such as the AI standards developed in the mid-2010s.

Even if AI-specific standards were not considered to be 'technical standards', they may still be covered by the Agreement. Indeed, Article VI of the GATS mentions technical standards among examples of domestic regulation, together with qualification requirements and procedures and licensing requirements. The Panel in the *Argentina – Financial Services* case found that there is no definition of domestic regulation in the GATS, and that the universe of domestic regulation, for Article VI itself, is broader than that relating to technical standards, licensing and qualifications.[857] The AB endorsed this findings by adding that domestic regulations should be construed in a broader sense and that there is a broader scope of measures that are covered by Article VI of the GATS.[858] The AB also clarified that the use of the word 'any' in the terms 'any

[855] Krajewski (n 51) 426.
[856] ibid 427.
[857] Panel Report, *Argentina — Measures Relating to Trade in Goods and Services*, WT/DS453/R, adopted on 9 May 2016 [7.835, 7.838].
[858] AB Report, *Argentina - Financial Services* (n 668) para 6.258.

measure' and 'any other form' in the definition of measure provided in Article XXVIII(a) of the GATS suggests that there is no a priori exclusion of the type or form that a measure may take under the Agreement.[859]

5.3.2.3 Subsidies

As discussed in Chapter 4, there is evidence to suggest that governments are starting to provide some form of financial assistance to companies operating in the AI field for the purpose of promoting this technology and capitalising on the benefits that could accrue from the widespread use of AI in the economy. Although it is unclear to what extent this financial assistance is currently provided specifically to AI companies operating in the services sector, it is possible that in the medium-long term more and more governments could resort to using AI-specific subsidies to enhance the competitiveness of their services sector. Consequently, questions may arise regarding the extent to which governments would be allowed to use this policy tool without violating GATS rules, especially when it is difficult to distinguish between subsidies that respond to political economy incentives and other schemes that aim at addressing genuine market distortions.[860]

The GATS offers no definition of 'subsidy'. Yet, most WTO Members appear inclined to point to the language of Article 1 of the SCM Agreement, which refers to subsidies as forms of financial assistance provided by central or local governments that confer a benefit to an enterprise or industry or group of enterprises or industries, to describe subsidies in the services trade context.[861]

Existing literature shows lack of agreement on whether the GATS already contains disciplines on services subsidies. Arguing that discriminatory services subsidies fall within the scope of application of the national treatment obligation, several scholars highlight how several GATS schedules contain a few limitations on (discriminatory) services subsidies.[862] Several WTO internal documents support this finding. For

[859] ibid 6.259.
[860] Mavroidis (n 599) 334.
[861] Sauvé and Soprana (n 717) 610. ibid.
[862] Adlung and Soprana (n 398) 49; Sauvé and Soprana (n 717) 606.

example, the 1993 Explanatory Note on Scheduling Guidelines indicates that Article XVII of the GATS applies to subsidy-type measures in the same way as it applies to all other measures, and that any discriminatory subsidy should be scheduled under Article XVII, although it goes on to clarify that the answers it provides to assist in the preparation of offers, requests and national schedules of initial commitments "should not be considered as an authoritative legal interpretation of the GATS".[863] The WTO Secretariat added to this by clarifying that subsidies are covered under the national treatment obligation because, unless indicated otherwise, in specific commitments that are free from NT subsidy-related limitations, any granted subsidy must not discriminate between national and like foreign services and service suppliers.[864] Also, in addressing the need to revise the Scheduling Guidelines, the Secretariat indicated that examples of some of the most common types of national treatment restrictions would include taxed measures, subsidies and grants, in the form of reservations on eligibility for subsidies to nationals.[865]

However, there is a possibility that, in fact, WTO Members erred in referencing subsidies in their GATS schedules. In commenting the type of information a schedule should contain, the Secretariat observed that, for transparency purposes, most schedules include references to measures that are not inconsistent with the GATS but fall outside the scope of Articles XVI, XVII and XVIII.[866] It claimed this was undesirable because even though the Members do not intend to given them legal force, their entry in the schedule in principle makes these references binding, raising questions as to the right of the Member concerned to amend the measures inscribed in their schedule.[867] As the Secretariat falls short of providing any specific example of what these references

[863] Group of Negotiations on Services, 'Scheduling of Initial Commitments in Trade in Services: Explanatory Note (3 September 1993)' (n 733) 1, 4.
[864] WTO, Working Party on GATS Rules, 'Subsidies and Trade in Services, Note by the Secretariat (6 March 1996)' S/WPGR/W/9 8.
[865] Committee on Specific Commitments, 'Revision of Scheduling Guidelines, Note by the Secretariat, MTN.GNS/W/164 and 164/Add.1 (5 March 1999)' S/CSC/W/19 9; WTO, Council for Trade in Services, 'WTO Doc. S/L/92' (n 731) 16.
[866] Committee on Specific Commitments, 'WTO Doc. S/CSC/W/19' (n 865) 3.
[867] ibid.

consist of, it is unclear whether references to subsidies could be considered as falling under this type of mistake.

Indeed, a minority of scholars are of the opinion that subsidies are not in fact covered by national treatment.[868] Arguing that the wording of Article XV:1 of the GATS suggests that at the advent of the WTO no disciplines existed to address trade-distortive effects caused by subsidies, Mavroidis opines that this means that nations did not agree to limit their sovereignty in this respect and, therefore, they should be allowed to subsidize domestic suppliers.[869] However, as Adlung and Mirodout rightly point out, suggesting that subsidies are completely exempt from already existing GATS disciplines, including national treatment, because of the negotiating mandate in Article XV that concerns the development of disciplines on trade-distortive subsidies, would be a misunderstanding of the Agreement.[870]

If (discriminatory) services subsidies are indeed covered by the national treatment obligation, as the majority of scholars argue, subsidies that target specific AI industries or specific AI companies supplying services that are powered by AI may violate a Member NT commitments, if said country has not scheduled limitations on subsidies under Article XVII but applies AI-specific subsidies in a way that favours domestic AI services and service suppliers over like foreign AI services and service suppliers. This means that in order to assess whether our country has violated its GATS specific commitments, WTO adjudicators would have to verify whether the country that imposes subsidies on AI domestic service suppliers has actually scheduled commitments on the specific sector where these companies operate (either in the sector specific column or in the horizontal section of their schedule) and whether they have scheduled any limitation on the granting of subsidies under the national treatment column.

[868] Mavroidis (n 599) 337; Carlo Maria Cantore, 'Book Review: Regulatory Autonomy and International Trade in Services. The EU Under GATS and RTAs, by Bregt Natens. (Cheltenham: Edward Elgar Publishing, 2016)' (2018) 55 Common Market Law Review 969.
[869] Mavroidis (n 599) 337.
[870] Rudolf Adlung and Sébastien Miroudot, 'Poison in the Wine? Tracing GATS-Minus Commitments in Regional Trade Agreements' (2012) 46 Journal of World Trade 1068.

On the other hand, if subsidies are not already disciplined under the GATS, as very few scholars suggest, until they fulfil the mandate under Article XV and come to an agreement on disciplines to address the trade-distortive effects of subsidies, WTO members remain free to provide discriminatory services subsidies that favour their domestic suppliers of AI-powered services.

5.3.3 Justifying inconsistencies with GATS Obligations and Commitments: General and Security Exceptions

Countries that adopt measures that could be in violation of GATS obligations and commitments may justify them by resorting to the general exceptions listed under Article XIV of the GATS. Three elements should be taken into consideration when discussing the justification of measures inconsistent with the GATS. First, governments may invoke a general exception to justify violations of both obligations and specific commitments, as established by the Panel in the *US – Gambling* case.[871] Secondly, differences in the standard of application exists between the various exceptions listed in Article XIV of the agreement.[872] Lastly, while the GATS leaves WTO Members with greater regulatory autonomy than the GATT, the Uruguay Round negotiators included a rather stringent necessity test to prevent GATS exceptions from being abused for protectionist purposes.[873]

According to the AB in *US – Gambling*, WTO adjudicators should carry out a two-tier analysis in order to verify whether a measure inconsistent with the GATS can be justified under Article XIV on general exceptions.[874] First, Panels must determine whether the measure can be provisionally justified under one of the specific exceptions. Then, the Panel must determine whether the measure meets the requirements of the chapeau, meaning that it is not applied in a manner that would constitute a means of arbitrary or unjustifiable discrimination between countries where similar conditions

[871] Panel Report, *US-Gambling* (n 680) para 6.528; Mavroidis (n 599) 415.
[872] AB Report, *US-Gambling* (n 64) para 292.
[873] Thomas Cottier, Panos Delimatsis and Nicolas F Diebold, 'Article XIV GATS: General Exceptions' in Rüdiger Wolfrum, Peter-Tobias Stoll and Clemens Feinäugle (eds), *Max Planck Commentaries on World Trade Law, WTO - Trade in Services*, vol 6 (Martinus Nijhoff Publishers 2008) 290; AB Report, *US-Gambling* (n 64) para 339.
[874] AB Report, *US-Gambling* (n 64) para 292.

prevail, or it is not a disguised restriction on trade in services. Notably, if a Panel does not find that the measure is provisionally justified under any of the exceptions listed in Article XIV of the GATS, it will not proceed to the second tier of the analysis, and thus it will not assess its consistency with the chapeau.[875]

Article XIV of the GATS contains (explicit) references to some of the ethical principles emerging from recent AI governance practice. For example, under letter (b) WTO Members can maintain, adopt or enforce measures necessary to protect human life or health, which recalls the wording of the 'prevention of harm' ethical principle developed by the EU High-Level Expert Group on AI.[876] On the other hand, Article XIV (c) of the GATS allows to justify WTO inconsistent measures on the basis of the need to secure compliance with laws or regulations relating to the prevention of deceptive practices, privacy, and safety, which are recurring themes among AI ethical principles.[877] One could also argue that the protection of public morals and public order mentioned in Article XIV (a) relates to the protection of ethical values, such as those referred to in emerging AI ethical principles and guidelines. Therefore, it is likely that WTO members would invoke Article XIV letters (a), (b) or (c) to justify the adoption of GATS-inconsistent measures aimed at mitigating the risks associated with the use of AI.[878]

In order to understand to what extent governments can make recourse to Article XIV of the GATS to justify the adoption of trade-restrictive AI-specific measures, this study proceeds with an in-depth discussion of each provisional justification and the role of the chapeau.

5.3.3.1 Provisional Justification: Article XIV(a)

Article XIV(a) of the GATS establishes that nothing prevents WTO Members from adopting or enforcing measures "necessary to protect public morals or maintain public order". The Panel in *US – Gambling* defined 'public morals' as "standards of right and

[875] Mavroidis (n 599) 415.
[876] See Chapter 4, Section 4.4.1.
[877] See Chapter 4 Section 4.4.1.
[878] See also Tuthill (n 276) 372.

wrong conduct maintained by or on behalf of a community or nation"[879] and 'public order 'as "the preservation of the fundamental interests of a society, as reflected in public policy and law".[880] It further clarified that the concept of 'public morals and public order' "can vary in time and space, depending upon the range of factors, including prevailing social, cultural, ethical and religious values"[881], a dynamic interpretation of public morals that, according to Wu, is in line with previous AB jurisprudence.[882] The Panel also suggested that WTO members "in applying similar societal concepts, have the right to determine the level of protection that they consider appropriate"[883], a concept that the AB had espoused in previous GATT disputes.[884]

Based on WTO jurisprudence and existing literature on the public morals exception, one could argue that Article XIV(a) of the GATS could cover ethical concerns brought on by AI. For example, ethical concerns - or at least the use of the term ethics or ethical - has been mentioned in the *US – Gambling* and *EC – Approval and Marketing of Biotech Products* cases.[885] Also, according to Lin, WTO adjudicators tend to have a deferential approach to the interpretation of public morals as exemplified by the cases in *US – Gambling*, *China – Publications and Audiovisual Products*, and *EC – Seal Products,*[886] leaving the WTO Members "to enjoy ample leeway in defining and applying public moral-based measures according to their own unique social systems and communal values".[887] Foster added that "the regulatory subject matter that could

[879] Panel Report, *US-Gambling* (n 680) para 6.465.
[880] ibid 6.467.
[881] ibid 6.461.
[882] Tim Wu, 'The World Trade Law of Censorship and Internet Filtering' (2006) 7 Chicago Journal of International Law 263, 231.
[883] Panel Report, *US-Gambling* (n 680) para 6.461.
[884] Appellate Body Report, *Korea — Measures Affecting Imports of Fresh, Chilled and Frozen Beef*, WT/DS161/AB/R, WT/DS169/AB/R, adopted on 10 January 2001 [176]; AB Report, *EC - Asbestos* (n 814) para 168.
[885] Panel Report, *US-Gambling* (n 680) para 6.461, 6.465; Panel Report, *European Communities — Measures Affecting the Approval and Marketing of Biotech Products*, WT/DS291/R, WT/DS292/R, WT/DS293/R, adopted on 21 November 2006 [7.408].
[886] Panel Report, *US-Gambling* (n 680) para 6.461-6.465; Panel Report, *China — Publications and Audiovisual Products* (n 642) para 7.759-7.763; Appellate Body Reports, *European Communities — Measures Prohibiting the Importation and Marketing of Seal Products*, WT/DS400/AB/R, WT/DS401/AB/R, adopted on 18 June 2014 [5.200-5.201].
[887] Lin, Ching-Fu, 'Public Morals, Trade Secrets, and the Dilemma of Regulating Automated Driving Systems' in Shin-Yi Peng, Lin, Ching-Fu and Thomas Streinz (eds), *Artificial Intelligence and*

potentially be protected remains broad", suggesting that "ethical matters brought on by new technologies could fall under the scope of the term public morals".[888] Therefore, certain ethical risks related to the use of AI (e.g. discrimination, bias, or breach of privacy), which may prompt governments to adopt potentially trade-restrictive AI-specific measures, could be considered as covered by the term 'public morals'.

However, even if AI ethical principles were to fall under the purview of Article XIV(a) of the GATS, issues remain about what are the public morals that matter. More specifically, which are the ethical values one should consider? Those that are shared by all countries across the world, or those shared only within the territory where these measures are undertaken and for which the general exception is invoked to justify a potential breach of obligations and commitments under the GATS agreement?

This is a highly debated issue among scholars. Some opined that the WTO Panels and the AB should not be excessively deferential to the meaning and identification of public morals[889], warning against the risks of moral imperialism, whereby "powerful countries impose their moral standards on other cultures and countries".[890] Others pointed out that WTO adjudicators appear to have rejected both a pure universalist approach and a pure unilateral approach without providing what a middle ground approach would entail.[891] While Wu suggests that universalism is problematic because the set of public morals that could be universally agreed-upon will be very limited[892], Charnovitz argues in favour of using international human rights law to ascribe meaning to the public morals exception, which could then "validate trade actions based on international

International Economic Law: Disruption, Regulation and Reconfiguration (Cambridge University Press 2021) 226.

[888] Caroline E Foster, 'The Problem with Public Morals' (2019) 10 Journal of International Dispute Settlement 622, 628–230.

[889] Ming Du, 'Permitting Moral Imperialism? The Public Moral Exception to Free Trade at the Bar of the World Trade Organization' (2016) 50 Journal of World Trade 675, 678; Foster (n 888) 647.

[890] Du (n 889) 676.

[891] Panel Report, *US-Gambling* (n 680) para 6.4.61; Mark Wu, 'Free Trade and the Protection of Public Morals: An Analysis of the Newly Emerging Public Morals Clause Doctrine Note' (2008) 33 Yale Journal of International Law 215, 233.

[892] Wu, 'Free Trade and the Protection of Public Morals: An Analysis of the Newly Emerging Public Morals Clause Doctrine Note' (n 891) 232.

norms while rejecting trade actions based on nationalistic aims".[893] Some scholars have also opposed the idea of originalism for interpreting the term 'public morals' recognizing that, as stated by the Panel in *US – Gambling*, public morals may vary over time.[894] Indeed, if public morals were to be interpreted as understood at the time of the GATS negotiations, one could argue that it would be almost impossible to justify any measure related to AI under the public morals clause, since it is unclear to what extent in the early 1990s society at large was aware of the ethical risks associated with the use of AI, which at the time was still far from ready for widespread commercialisation, and relatively unknown to the masses.

Are there any instruments that Panels and the AB could rely on to form an opinion on what falls under the scope of application of public morals? In *US – Gambling* the Panel resorted to supplementary means of interpretation to determine the meaning of 'public order'.[895] According to Foster, there are different types of information that WTO adjudicators could use, including assertions by governments, comparative materials from other jurisdictions, widely accepted treaties, and amicus curiae briefs.[896] Thus, one could argue that the proliferation of government guidelines, policy briefs, white papers and other materials containing ethical principles on AI may be used to help WTO adjudicators decide to what extent public morals cover said principles. Recalling that recent studies have shown that there is a certain convergence on a number of ethical principles[897], one could argue that if a measure were to be justified under the public morals exception by referring to these ethical principles where there is some degree of common ground among countries, it is more likely that WTO adjudicators may find that measure to be considered as falling under the scope of the term 'public morals'.

[893] Steve Charnovitz, 'The Moral Exception in Trade Policy' (1998) 38 Virginia Journal of International Law 689, 742–743.
[894] Wu, 'Free Trade and the Protection of Public Morals: An Analysis of the Newly Emerging Public Morals Clause Doctrine Note' (n 891) 237; Du (n 889).
[895] Panel Report, *US-Gambling* (n 680) para 6.470-6.473; Cottier, Delimatsis and Diebold (n 873) 294.
[896] Foster (n 888).
[897] See Chapter 4, Section 4.4.1.

Referring to the protection of public morals or the maintenance of public order is not enough to provisionally justify a measure under letter (a) of Article XIV of the GATS. The measure must also be 'necessary' to achieve that objective. According to the AB in *US – Gambling*, the necessity test consists of a weighing and balancing of three factors – i.e. the assessment of the relative importance of the values furthered by the challenge measured, the contribution of the measure to the realization of the ends pursued by it, and the restrictive impact of the measures on international commerce - as well as a comparison of the measure with alternative measures, taking into account important interests at stake.[898] The AB went on to clarify that an alternative measure may not be considered as reasonably available if it is only theoretical in nature, meaning that the member is not capable of taking it or the measure imposes an undue burden on the Member (e.g. prohibitive costs or substantial technical difficulties), and that a reasonably available alternative must preserve the right of the Member to achieve its desired level of protection.[899] For the necessity test under Article XIV(a) of the GATS the burden of proof rests on the respondent that has to show from a *prima facie* case that the measure is necessary, on the complainant as regards the identification of alternative measures, and again on the respondent to demonstrate why the challenged measure remains necessary even in light of alternatives or why the alternative measures are not reasonably available.[900] As Tuthill observes, the necessity test implies the notion of proportionality, meaning that the measure must be proportional to the problem, i.e. no more trade restrictive than it needs to be to achieve the stated policy objective.[901] As the AB noted in *China – Publications and Audiovisual Products*, the least restrictive a measure is, the more likely it is to be characterised as 'necessary'.[902] Overall, the conditions set out by the necessity test (weighing and balancing, alternative measures and proportionality) could place quite significant restrictions on the ability of governments to invoke Article XIV(a) to justify trade-restrictive AI-specific measures.

[898] AB Report, *US-Gambling* (n 64) paras 306–311.
[899] ibid 308.
[900] ibid 309–311.
[901] Tuthill (n 276) 373.
[902] AB Report, *China - Publications and Audiovisual Products* (n 64) para 310.

5.3.3.2 Provisional Justification: Article XIV(b)

Governments may attempt to justify potentially GATS-inconsistent measures aimed at minimizing risks derived from the use of AI under Article XIV(b) of the agreement, which establishes that WTO Members can adopt or implement trade-restrictive measures "necessary to protect human, animal or plant life or health". As of September 2021, no GATS dispute has ever addressed and discussed Article XIV(b). However, because of the similarities between Article XX of the GATT and Article XIV of the GATS, Panels and the AB have relied on GATT precedents to interpret and apply Article XIV of the GATS.[903] Therefore, case law under Article XX(b) of the GATT could provide a source of inspiration for adjudicators of GATS disputes as well.[904]

WTO adjudicators identified a two-tier test to determine whether a measure can be provisionally justified under Article XX(b): (i) the measure aims to 'protect human, animal or plant life or health'; and (ii) the measure is 'necessary' to pursue the policy objective.[905] As regards the first step, Panels and the AB look at the design and structure of the measure.[906] Some scholars argue that WTO adjudicators have shown a significant degree of deference in accepting that the policy objective of a measure falls under the scope of Article XX(b) of the GATT.[907] Thus, if a government indicated that a measure were adopted to minimise the risk that AI systems cause harm or endanger the life of humans (e.g. requirements that automated decision-making in the health sector be always subject to human oversight), Panels and the AB would likely consider said policy objective as covered by Article XIV(b) of the GATS.

The second element of the two-tier test, the necessity test, raises more interpretative issues than the first.[908] As in the case of Article XIV(a), determining whether a measure

[903] Eric H Leroux, 'From Periodicals to Gambling: A Review of Systemic Issues Addressed by WTO Adjudicatory Bodies under the GATS' in Marion Panizzon, Nicole Pohl and Pierre Sauvé (eds), *GATS and the Regulation of Trade in Services* (Cambridge University Press 2008) 265; AB Report, *US-Gambling* (n 64) para 291.
[904] Mavroidis (n 599) 429; Matsushita and others (n 642) 618.
[905] Panel Report, *United States - Standards for Reformulated and Conventional Gasoline*, WT/DS2/R, adopted on 20 May 1996 [6.20]; Panel Report, *Brazil — Measures Affecting Imports of Retreaded Tyres*, WT/DS332/R, adopted on 17 December 2007 [7.40-7.41]; Van den Bossche and Zdouc (n 647) 554.
[906] Van den Bossche and Zdouc (n 647) 554.
[907] ibid.
[908] ibid 556.

is 'necessary' within the meaning of Article XIV(b) would require a Panel to weigh and balance the importance of the interests or values at stake, the extent of the contribution to the achievement of the objective and the trade restrictiveness of the measure, and compare it with possible less restrictive alternative measures.[909] According to the AB in *EC – Asbestos*, the more important the societal value pursued by the measure at issue is (e.g. human life and health), and the more this measure contributes to the protection and promotion of this value, the more easily the measure can be considered to be necessary.[910] At the same time, the AB also indicated that the more restrictive the impact of the measure of tissue is on international trade, the more difficult it is to consider that measure necessary.[911] Thus, a government that were to invoke Article XIV(b) to justify adopting a GATS-inconsistent AI-specific measure will have to show how important the values at stake are (e.g. minimising risks to human life and health posed by AI systems), and how much the measure contributes to protecting them (e.g. without the measure the rate of misdiagnosis caused by unsupervised AI systems is higher than without it). It will also have to demonstrate that these two factors combined outweigh the potential trade restrictiveness of the measure (e.g., services suppliers that use unsupervised AI systems for diagnostic services are not allowed to operate in the territory of the country imposing the measure) and that no alternative less trade-restrictive measures can achieve the intended policy objective.

Three elements should be kept in mind. First, Members can only bring a challenge to the necessity of the measure but not the level of protection it is intended to achieve, as the AB clarified that it is for WTO members to determine the level of protection of health or the environment they consider appropriate.[912] Moreover, the risk to human life or health may be evaluated either in quantitative or qualitative terms, with no requirement to quantify it.[913] Secondly, WTO Members are not obliged to follow the

[909] AB Report, *US-Gambling* (n 64) paras 306–307; *Appellate Body Report, Brazil — Measures Affecting Imports of Retreaded Tyres, WT/DS332/AB/R, adopted on 17 December 2007* 178.
[910] AB Report, *EC - Asbestos* (n 814) para 172; Van den Bossche and Zdouc (n 647) 557.
[911] AB Report, *Brazil - Retreaded Tyres* (n 909) para 150.
[912] Van den Bossche and Zdouc (n 647) 558; AB Report, *US-Gambling* (n 64) para 308; AB Report, *EC - Asbestos* (n 814) para 168.
[913] AB Report, *EC - Asbestos* (n 814) para 167.

majority scientific opinion in setting health policy and WTO adjudicators need not, necessarily, reach a decision on the basis of the 'preponderant' weight of the evidence.[914] Lastly, some scholars argue that the necessity test under this general exception reflects deference towards domestic regulations and, further to *Korea – Various Measures on Beef* and *EC – Asbestos*, additional flexibility in the application of the necessity standard, potentially alleviating the fears of services regulators about their regulatory autonomy being unduly restrained.[915]

5.3.3.3 Provisional Justification: Article XIV(c)

The third type of justification that WTO members may bring forward to justify a violation of its obligations or commitments under the GATS can be found in Article XIV(c). According to this provision, any WTO member can adopt or enforce measures that are necessary to secure compliance with laws or regulations which are not inconsistent with the provision of this agreement including those relating to: (i) the prevention of deceptive and fraudulent practices; (ii) the protection of privacy; and (iii) safety. For example, based on the Oxford Dictionary definition of the term 'deceptive' ("likely to make you believe something that is not true"[916], which is similar to the term 'misleading', which means "giving the wrong idea or impression"[917]), one could argue that 'the prevention of deceptive and fraudulent practices' may be interpreted to cover laws restricting the use of automated decision-making tools[918], like chat bots, which may sometimes mislead consumers who are unfamiliar with AI technologies into believing that they are actually interacting with a human being rather than a machine. Also, the 'protection of privacy' and 'safety' could cover laws or regulations imposing requirements on the management and quality of data sets used to train AI systems or

[914] ibid 178.
[915] Leroux (n 903) 269–270.
[916] Oxford Advanced Learner's Dictionary, 'Deceptive' <https://www.oxfordlearnersdictionaries.com/definition/english/deceptive> accessed 29 September 2021.
[917] Oxford Advanced Learner's Dictionary, 'Misleading' <https://www.oxfordlearnersdictionaries.com/definition/english/misleading> accessed 29 September 2021.
[918] See for example Article 22(1) of the GDPR which establishes that "[t]he data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her."

human oversight. Notably, the terms safety and privacy are often explicitly cited among the list of AI ethical principles that governments have recently drawn up as part of their efforts to govern and regulate this technology.

However, there are two factors to keep in mind about Article XIV(c). First, the list of laws and regulations is illustrative and not exhaustive.[919] This means that the range of laws and regulations falling under this exception is broader than the three examples explicitly mentioned in letters (i) to (iii). Therefore, governments could invoke Article XIV(c) to justify the adoption of trade-restrictive measures that are necessary to secure compliance with a potentially wide range of laws or regulations related to AI governance.

Secondly, the legal standard for determining whether a measure is provisionally justified under Article XIV(c) could be somewhat stringent. According to WTO jurisprudence[920], in order to determine whether a measure is provisionally justified under Article XIV(c), a Member must demonstrate three elements.[921] First, the measure at issue must be designed to 'secure compliance' with national laws or regulations.[922] The Panel in *US – Gambling* clarified that, in light of the finding of the GATT Panel in *EEC – Regulation on Imports of Parts and Components* with respect to Article XX(d) of the GATT[923], the reference to 'secure compliance' should be considered to indicate that the "measures for which justification is sought must 'enforce' the relevant laws and regulations" and they must enforce obligations rather than "merely ensure attainment of the objectives of those laws and regulations".[924] Therefore, as

[919] Panel Report, *US-Gambling* (n 680) para 6.450; Panel Report, *Argentina - Financial Services* (n 857) para 7.582.
[920] The Panels in *Argentina - Financial Services* and *US - Gambling* claimed that the legal standard set forth by the AB in *Korea - Various Measures on Beef* for Article XX(d) of the GATT[920] is relevant for the analysis of Article XIV(c) of the GATS. AB Report, *Korea — Various Measures on Beef* (n 884) para 157; Panel Report, *US-Gambling* (n 680) Footnote 990; Panel Report, *Argentina - Financial Services* (n 857) para 7.59. See also Panel Report, *Colombia — Indicative Prices and Restrictions on Ports of Entry,* WT/DS366/R, adopted on 20 May 2009 [7.514].
[921] Panel Report, *US-Gambling* (n 680) para 6.536; Panel Report, *Argentina - Financial Services* (n 857) para 7.593.
[922] Panel Report, *US-Gambling* (n 680) para 6.536; Van den Bossche and Zdouc (n 647) 591.
[923] GATT Panel Report, *EEC - Regulation on Imports of Parts and Components*, L/6657 - 37S/132, adopted on 16 May 1990) [5.24].
[924] Panel Report, *US-Gambling* (n 680) para 6.538.

Mavroidis points out, "only measures that are meant to enforce substantive obligations, come under the purview of this provision".[925] On the other hand, the Panel clarified that the measure does not have to be designed exclusively to secure compliance but it is sufficient that securing compliance is actually part of the reason to put the measure into place.[926] It also clarified that, following the same reasoning of the AB in *Mexico – Taxes on Soft Drinks*[927], 'securing compliance' does not imply that they need to guarantee the achievement of the result with absolute certainty.[928]

The second element under Article XIV(c) relates to the relationship between the national laws and regulations at issue and the GATS. More specifically, the WTO Member must demonstrate that the 'laws and regulations' with which the challenged measure is intended to secure compliance are not inconsistent with the Agreement.[929] Therefore, an inconsistency with the GATS automatically leads to the impossibility of invoking Article XIV(c).[930] As recalled by the Panel in *Argentina – Financial Services*, there is a presumption of consistency of a members legislation until proven otherwise, with the complaining party bearing the burden of proof of any inconsistency with specific provisions of the agreement at issue.[931] Four factors should be taken into account. First, there is no limitation a priori on the types of laws and regulations consistent with the GATS with which a Member would seek to secure compliance.[932] Secondly, 'identifying' laws and regulations means that it is not enough for the respondent to simply referred to them or to the provisions: the WTO member must provide the text.[933] Also, the concept of rules and regulations covers "rules that form part of the domestic legal system of a WTO member, including rules deriving from international agreements that have been incorporated into the domestic legal system

[925] Mavroidis (n 599) 430.
[926] Panel Report, *US-Gambling* (n 680) para 6.539.
[927] Appellate Body Report, *Mexico — Tax Measures on Soft Drinks and Other Beverages,* WT/DS308/AB/R, adopted on 24 March 2006 [74].
[928] Panel Report, *Argentina - Financial Services* (n 857) para 7.628.
[929] Panel Report, *US-Gambling* (n 680) para 6.536.
[930] Mavroidis (n 599) 429.
[931] Panel Report, *Argentina - Financial Services* (n 857) para 7.625; AB Report, *US-Gambling* (n 64) para 138; Appellate Body Report, *United States — Countervailing Duties on Certain Corrosion-Resistant Carbon Steel Flat Products from Germany*, WT/DS213/AB/R, adopted on 19 December 2002 [157].
[932] Panel Report, *Argentina - Financial Services* (n 857) para 7.538.
[933] ibid 7.609.

of a WTO Member or have direct effect according to that WTO Member's legal system".[934] Lastly, Members retain the right to determine the level of enforcement of GATS-consistent laws and regulation, meaning that they are free to decide whether they want to achieve a zero-risk level of protection of the policy objective pursued or simply minimise the risk to an acceptable level.[935]

The third, and last, element of the legal standard for the analysis under Article XIV(c) of the GATS requires the WTO Member imposing the measure to demonstrate that it is necessary to secure compliance with those national laws and regulations.[936] In assessing the necessity test under this general exception, WTO adjudicators can use the previously mentioned standard of necessity developed by the AB in the *US – Gambling* case for the analysis of letter (a) of Article XIV and in the *EC – Seal Products* case.[937]

Thus, a government imposing an AI-specific measure (e.g., a ban on the commercialisation of services that use facial recognition technology or requiring the adoption of AI-specific technical standards for training data) may be able to invoke Article XIV(c) as long as it is able to demonstrate that the measure is designed to enforce obligations contained in a GATS-consistent domestic law or regulation (e.g. privacy protection law, AI regulation) and that the measure fulfils the necessity test.

5.3.3.4 Chapeau of Article XIV

Based on the two-tier analysis established by the AB in *US – Gambling*, a GATS-inconsistent measure can be justified under Article XIV on general exceptions if is found to be provisionally justifiable under one of the specific exceptions and it fulfils the requirements of the chapeau.[938] Due to similarities in language between Article XX of the GATT and Article XIV of the GATS, case law on the application of the chapeau

[934] AB Report, *Mexico — Taxes on Soft Drinks* (n 927) paras 70, 79; Panel Report, *Argentina - Financial Services* (n 857) para 7.607; Cottier, Delimatsis and Diebold (n 873) 301.
[935] AB Report, *Korea — Various Measures on Beef* (n 884) para 173; Cottier, Delimatsis and Diebold (n 873) 302.
[936] Panel Report, *US-Gambling* (n 680) para 6.536; Panel Report, *Argentina - Financial Services* (n 857) para 7.593.
[937] Panel Report, *Argentina - Financial Services* (n 857) para 7.658-7.660.
[938] AB Report, *US-Gambling* (n 64) para 292.

of Article XX can be applied *mutatis mutandis* to the interpretation of Article XIV, as confirmed by the Panel in *US – Gambling*.[939]

As clarified by the Panel in *Brazil - Retreaded Tyres*, the chapeau of Article XX of the GATT focuses on the manner in which the provisionally justified measure is applied.[940] The AB in *US – Gambling* indicated that also the chapeau of Article XIV of the GATS focuses on the 'application' of a provisionally justified measure.[941] According to the AB in *Japan-Alcoholic Beverages II*, the application "can most often be discerned from the design, the architecture, and the revealing structure" of said measure.[942] The AB further explained that inquiring on the manner in which a measure is applied involves a "consideration of 'both substantive and procedural requirements' under the measure at issue".[943]

The chapeau requires that a measure is not applied in a manner that constitutes 'arbitrary or unjustifiable discrimination between countries where the same conditions prevail' or a 'disguised restriction on trade in services'.[944] Purpose of the chapeau is to prevent the abuse of the general exceptions under Article XIV or any frustration of the rights accorded to other members by the substantive rules of the GATS.[945] Thus, as Van den Bossche and Zdouc argue, interpreting and applying the chapeau in any particular case consists in finding the balance between the right of Members to adopt and maintain trade-restrictive legislation and measures that pursue certain legitimate societal values or interests, on the one hand, and the right of other Members to trade, on the other.[946] As stated by the AB in *US – Shrimp*, the line of equilibrium between

[939] Panel Report, *US-Gambling* (n 680) para 6.581; Cottier, Delimatsis and Diebold (n 873) 301.
[940] Panel Report, *Brazil - Retreaded Tyres* (n 905) para 7.107.
[941] AB Report, *US-Gambling* (n 64) para 339; Van den Bossche and Zdouc (n 647).
[942] AB Report, *Japan — Alcoholic Beverages II* (n 814) 29; Panel Report, *European Communities — Measures Affecting Asbestos and Asbestos-Containing Products*, WT/DS135/R, adopted on 5 April 2001 [8.236].
[943] AB Report, *EC - Seal Products* (n 886) para 5.302; Appellate Body Report, *United States - Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS58/AB/R, adopted on 6 November 1998 [160].
[944] AB Report, *US-Gambling* (n 64) para 339.
[945] Panel Report, *US-Gambling* (n 680) para 339; Cottier, Delimatsis and Diebold (n 873) 301.
[946] Van den Bossche and Zdouc (n 647) 574.

Members' competing rights "moves as the kind and the shape of the measures at stake vary and as the facts making up specific cases differ".[947]

In *US – Shrimp* the AB held that three elements must be considered to determine that a measure is applied in a manner that would constitute 'arbitrary or unjustifiable discrimination where the same conditions prevail: (i) the application of the measure results in discrimination; (ii) the discrimination must be arbitrary or unjustifiable in character; and (iii) the discrimination must occur between countries where the same conditions prevail.[948] If a measure is applied in a rigid and inflexible manner, it is more likely that its application would constitute an 'arbitrary or unjustifiable discrimination' under the chapeau of Article XIV of the GATS.[949]

As regards the determination of whether the application of a measure constitutes a 'disguised restriction to trade', WTO jurisprudence clarified that, although there can be an overlap between 'arbitrary and unjustifiable discrimination' and 'disguised restriction to trade', the latter covers other measures as well.[950]

So far, in GATS disputes where WTO adjudicators were asked to verify whether a Member's invocation of Article XIV was justified, no Member has been able to meet the requirements of the chapeau, sparking concerns that the latter significantly restricts governments' regulatory autonomy. While the AB has clarified, under GATT jurisprudence, the limited nature of its rulings, pointing out that WTO Members remain free to adopt policies aimed at protecting certain societal values as long as, in doing so, they fulfil their obligations under the WTO agreements[951], governments may find it difficult to successfully invoke Article XIV of the GATS to justify the adoption of trade-restrictive measure that aim to promote AI innovation and/or mitigate the risks associated with its use.

[947] AB Report, *US-Shrimp* (n 943) para 159.
[948] Ibid 150.
[949] Cottier, Delimatsis and Diebold (n 873) 304; Van den Bossche and Zdouc (n 647) 575.
[950] Appellate Body Report, *United States - Standards for Reformulated and Conventional Gasoline,* WT/DS2/AB/R, adopted on 20 May 1996 [25]; Cottier, Delimatsis and Diebold (n 873) 304.
[951] AB Report, *US-Shrimp* (n 943) paras 185–6; AB Report, *US - Gasoline* (n 950) paras 29–30.

5.3.3.5 National Security exception: Article XIV *bis*

To justify the adoption of AI-specific measures that may be inconsistent with the agreement, it is possible that WTO members could invoke the security exception under Article XIV *bis* of the GATS.[952] Indeed, a few countries have referred to matters of national security when imposing new regulatory measures in the digital economy.[953] However, while some scholars suggest that the national security exception could be invoked to justify WTO-inconsistent measures that may affect trade in AI-powered services (e.g. data localization requirements and cybersecurity measures)[954], doubts remain as to whether Article XIV *bis* of the GATS can constitute a valid defence.[955]

In the absence of a universally accepted definition of 'national security', WTO Members have rarely invoked the security exception, which some scholars consider to be the widest and most dangerously ambiguous among the exceptions listed in the WTO texts.[956] Since the adoption of the GATT in 1947 the contracting parties - and, after 1994, the WTO members - have adopted an exceptionalist approach to dealing with security disputes, largely handling them through diplomatic discussions rather than through recourse to the formal dispute settlement system.[957] They recognised that the invocation of the national security exception could lead to its abuse, setting a dangerous precedent for the justification of blatant violations of WTO agreements.[958] As of today, no GATS dispute has involved a judicial review of the national security exception. However, in 2017 Russia invoked Article XXI of the GATT to justify it

[952] This supposition is based on the suggestion by Zhang and Shang that restrictions to AI powered products could be justified under the security exception of Article XXI of the GATT, whose language closely resembles Article XIV *bis* of the GATS, although they warn that policy concerns might in practice restrain such an invocation. Zhang and Shang (n 37) 42.
[953] Ferracane (n 26) 45.
[954] Ferracane (n 26); Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (n 376); Susan Ariel Aaronson, 'What Are We Talking About When We Discuss Digital Protectionism?' (2017) Working Paper for the Economic Research Institute of Asia (Eria) <https://papers.ssrn.com/abstract=3032108> accessed 25 October 2021.
[955] Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (n 376) 575.
[956] Ferracane (n 26) 44; Daria Boklan and Amrita Bahri, 'The First WTO's Ruling on National Security Exception: Balancing Interests or Opening Pandora's Box?' (2020) 19 World Trade Review 123, 124.
[957] J Benton Heath, 'The New National Security Challenge to the Economic Order' (2019) 129 Yale Law Journal 1020, 1055.
[958] Boklan and Bahri (n 956) 125; Roger P Alford, 'The Self-Judging WTO Security Exception' (2011) 2011 Utah Law Review 697, 698.

measures restricting international transit cargo by road and rail from Ukraine to Kazakhstan and Kyrgyzstan. Since the texts of the national security exception under the GATS and the GATT bear a striking similarity[959], the reasoning of the Panel in the case *Russia – Traffic in Transit* could be informative as to the legal standard that WTO adjudicators in a GATS dispute involving Article XIV *bis* may follow.[960] The following analysis, therefore, is based on GATT jurisprudence.

Before the dispute between Ukraine and Russia, only two other cases discussed the GATT national security exception: the *US – Nicaraguan Trade* case[961] in the GATT era, and *China-Raw Materials*, the first case in the WTO era to make a reference to the language of Article XXI of the GATT. According to Mavroidis, the Panel in *US – Nicaraguan Trade* indicated that invocations of Article XXI of the GATT where justiciable, though it refrained from elaborating further since the US stated that they will never implement any adverse Panel decision, whereas the Panel in *China – Raw Materials* stopped short of holding that this provision is not justiciable at all, claiming that WTO adjudicators should hold a very deferential standard of review when national security concerns were raised as a defence for the violation of an obligation assumed under the GATT.[962]

[959] Both Articles allow countries to take any action which they consider necessary for the protection of their essential security interests taken in time of war or other emergency in international relations (subparagraph (iii) of both Article XXI(b)of the GATT and of Article XIV bis(b)). The language in subparagraphs (i) and (ii) in both articles differs slightly. Under the GATT security exception members can take measures necessary for the protection of their essential security interests relating to fissionable materials or the materials from which they are derived (subparagraph (i)), or relating to the traffic in arms, ammunition and implements of war and such trafficking out of goods and materials as is carried on directly or indirectly for the purpose of supplying a military establishment (subparagraph (ii)). Under the GATS security exception members can take measures necessary for the protection of their essential security interests relating to the supply of services is carried out directly or indirectly for the purpose of provisioning a military establishment (letter (i)), or relating to fissionable and fusionable materials from which they are derived (letter (ii).

[960] Notably, the Panel in the *Saudi Arabia – IPRs* case also referred to *Russia – Traffic in Transit* for its interpretation of Article 73(b)(iii) of the TRIPS Agreement, whose language is very similar to Article XXI(b)(iii) of the GATT and Article XIV bis(b)(iii) of the GATS. Panel Report*, Saudi Arabia — Measures concerning the Protection of Intellectual Property Rights,* WT/DS567/R, not adopted yet [7.241].

[961] GATT Panel Report, *United States – Trade Measures Affecting Nicaragua*, L/6053, 13 October 1986, unadopted.

[962] Mavroidis (n 599) 438; Panel Report, *China — Measures Related to the Exportation of Various Raw Materials*, WT/DS394/R, WT/DS395/R WT/DS398/R, adopted on 22 February 2012 [7.276].

In *Russia – Traffic in Transit*, the first WTO ruling on the national security exception, the Panel offered clarifications on the interpretation of Article XXI of the GATT. First, it affirmed that this provision cannot be interpreted as an 'outright potestative condition' (i.e. a self-judging clause) since subjecting the existence of a member's obligations to a mere expression of the unilateral will of said member would be contrary to the security and predictability of the multilateral trading system.[963] This finding somewhat counters the view held by some scholars that Article XXI(b) of the GATT should be interpreted as being self-judging because the underlying issues are highly political and relate to matters of state sovereignty.[964]

Moreover, it found that Article XXI(b)(iii) is justiciable, meaning that actions taken under this provision can be reviewed by WTO adjudicators who have the jurisdiction to determine whether the requirements of Article XXI(b)(iii) are satisfied.[965] It clarified, however, that under the security exception WTO Members enjoy some leeway to determine what their essential security interests are, and the necessity of action to protect said interests, a latitude that is not available when invoking general exceptions.[966] Also, it held that the three sets of circumstances under subparagraphs (i) to (iii) of Article XXI(b) of the GATT operate as 'limitative qualifying clauses' that specify and circumscribe the exercise of the discretion accorded to Members under the chapeau to these circumstances.[967]

The Panel provided a two-tier test for the examination of Article XXI of the GATT. It established that WTO adjudicators must first examine whether a measure falls within the scope of application of Article XXI of the GATT (i.e. whether it was facing one of the three distinct situations enumerated under letter (b)), and only afterwards, if they found that the measure does not relate to fissionable materials or to traffic in arms, or was not taken in time of war or other emergency in international relations, they would

[963] Panel Report, *Russia — Measures Concerning Traffic in Transit*, WT/DS512/R, adopted on 26 April 2019 [7.79]; Mavroidis (n 599) 438.
[964] Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (n 376) 576.
[965] Boklan and Bahri (n 956) 135; Panel Report, *Russia - Traffic in Transit* (n 963) para 7.103-7.104.
[966] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.98; Mavroidis (n 599) 440.
[967] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.65.

determine its consistency with the provision(s) at issue in the dispute.[968] This marks a significant departure from the three-tier standard of analysis traditionally used in cases when members invoke a general exception, when Panels and the AB first determine whether the measure at issue falls within the scope of application of a provision, then they establish its consistency with said provision, and only later they assess whether the violation can be justified through recourse to a general exception.[969]

Based on the GATT jurisprudence, if a WTO Member were to invoke the national security exception under Article XIV *bis* of the GATS to justify the adoption of potentially GATS-inconsistent AI-specific measures, the Panel and AB would first have to determine whether the measure at issue falls under either one of the three subparagraphs (i) to (iii)[970], and then whether it meets the requirements of the chapeau. While the *Russia – Traffic in Transit* dispute offers useful insights on how to interpret subparagraph (iii) of Article XIV *bis* (1)(b) from an AI perspective, WTO jurisprudence has so far provided little guidance on how to interpret subparagraphs (i) and (ii), making it difficult to assess the extent to which these two subparagraphs may cover efforts to govern artificial intelligence. Under Article XIV *bis* (1)(b)(i), governments could argue that certain restrictions affecting trade in AI-powered services are necessary to protect essential security interests relating to military procurement on the basis that AI is a dual-purpose technology that can be implemented both for civil and military purposes. Similarly, to the extent that AI-powered services relate to nuclear fission and fusion, both for military and civil purposes, a government could invoke Article XIV *bis* (1)(b)(ii) to derogate from its GATS obligations and commitments, although some scholars expressed uncertainty

[968] ibid 7.108-7.109; Mavroidis (n 599) 439.
[969] Mavroidis (n 599) 439; Peter Van den Bossche and Sarah Akpofure, 'The Use and Abuse of the National Security Exception under Article XXI(b)(Iii) of the GATT 1994' (2020) WTI Working Paper No. 03/2020 8–9.
[970] According to the Panel in *Russia – Traffic in Transit*, since the subject matters described in each of the three subparagraphs are substantially different, subparagraphs (i) to (iii) describe alternative rather than cumulative requirements that the action in question must meet to fall within the scope of application of Article XXI(b) of the GATT. Panel Report, *Russia - Traffic in Transit* (n 963) para 7.68. A similar reasoning would apply to the conditions set in Article XIV *bis* (1(b) of the GATS.

about the practical application of this provision to the realm of services.[971] However, since WTO jurisprudence clarified that in both cases the phrase 'relating to' requires an objective determination that there is a "close and genuine of ends and means" between the measure and the objective it aims to pursue, the government invoking the security exception will have to demonstrate that there is a substantial relationship between the AI-specific measures and the supply of services to a military establishment under subparagraph (i), or fissionable or fusionable materials under subparagraph (ii).[972]

Governments competing for AI leadership could invoke Article XIV *bis* (1)(b)(iii) to justify the adoption of GATS-inconsistent measures citing the so-called 'AI race' as an 'emergency in international relations'. The Panel in *Russia – Traffic in Transit* established that an 'emergency in international relations' includes war and refers generally to a situation of armed conflict, or of latent armed conflict or of heightened tension or crisis, or of general instability engulfing and surrounding a state, adding that the term 'international relations' refers to 'world politics' or 'global political interaction, primarily among sovereign states' [973] Thus, although some scholars suggest that the term 'crisis' provides some margin to include situations that go beyond armed conflict[974], the fact that the Panel in *Russia – Traffic in Transit* clarified that "the existence of an emergency in international relations is an objective state of affairs" and that "the determination of whether the action was 'taken in time of' an 'emergency in international relations' under subparagraph (iii) of Article XXI(b) is that of an objective fact, subject to objective determination", [975] it is unlikely that WTO adjudicators would label the 'AI race' as an emergency in international relations for the purposes of subparagraph (iii). On the one hand, there is no objective evidence to

[971] Panagiotis Delimatsis and Thomas Cottier, 'Article XIV Bis GATS: Security Exceptions' in Rüdiger Wolfrum, Peter-Tobias Stoll and Clemens Feinäugle (eds), *Max Planck Commentaries on World Trade Law, WTO - Trade in Services*, vol 6 (Martinus Nijhoff Publishers 2008) 338.
[972] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.69; AB Report, *US-Shrimp* (n 943) 136; Appellate Body Report, *China — Measures Related to the Exportation of Various Raw Materials*, WT/DS394/AB/R, WT/DS395/AB/R, WT/DS398/AB/R, adopted on 22 February 2012 [355].
[973] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.72-7.73, 7.76.
[974] Viktoriia Lapa, 'GATT Article XXI as a Way to Justify Food Prohibitions Adopted as a Response to COVID-19?' (2020) 15 Global Trade and Customs Journal 340, 341.
[975] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.77.

suggest that it is an armed conflict or a latent armed conflict, even though AI technologies could be used for military purposes. On the other hand, political or economic differences between Members are not sufficient, of themselves, to constitute a situation of heightened tension or crisis or of general instability.[976]

As regards the requirements of the chapeau of Article XIV bis(1)(b), although governments that seek to invoke the security exception to justify the adoption of AI-specific measures that derogate from their GATS obligations and commitments have a certain discretion to decide what its 'essential security interests' are and which measures are 'necessary to protect said interests, this discretion is not without limits.[977] 'Essential security interests' is a narrower concept than 'security interests' and refers to those interests relating to the quintessential functions of the state like protecting the territory and the population from external threats and maintaining law and public order.[978] It is left to each WTO Member to define what it considers to be its essential security interests, although this discretion is limited by the obligation to interpret and apply the security exception in good faith.[979] This means that WTO Members cannot use this provision to circumvent their obligations under the Agreement by defining their essential security interests in a capricious or uncertain manner, including by labelling pure trade interests as essential security interests.[980] Therefore, Members must articulate their essential security interests with sufficient specificity to demonstrate the veracity of their claim, and show that the measures at issue meet a minimum requirement of plausibility as protective of said essential security interests.[981] With respect to the interpretation of the term 'which it considers' in the chapeau of Article XXI(b), the Panel in *Russia – Traffic in Transit* held that the use of this adjectival clause implies that the determination of the necessity of the measures for the protection of its essential security interests must be left to the invoking member.[982] It

[976] ibid 7.75.
[977] ibid 7.131-7.132, 7.138, 7.146; Van den Bossche and Akpofure (n 969) 25–26.
[978] Panel Report, *Russia - Traffic in Transit* (n 963) 7.130.
[979] ibid 7.132.
[980] ibid 7.133; Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (n 376) 578; Mavroidis (n 599) 439.
[981] Panel Report, *Russia - Traffic in Transit* (n 963) para 7.135, 7.138.
[982] ibid 7.146; Boklan and Bahri (n 956) 133.

clarified that there is no need to determine that there are no reasonably available alternative measure.[983] As regards the use of the term 'it considers necessary', its self-judging nature implies that the necessity test under the general exceptions is more stringent than the necessity test under the national security exception, since the chapeau of Article XX of the GATT refers only to 'necessary'.[984] However, as Mishra notes, while the 'plausibility' standard appears to be a lower threshold than necessity, allowing Panels to be somewhat deferential to the security objectives of Members, the 'good faith' standard can still be intrusive, and likely to cause political dissatisfaction among WTO Members that could perceive the scrutiny of security measures as an affront to their sovereignty.[985]

5.4 Case study: EU proposal on AI regulation

In April 2021 European Commission circulated a proposal for a regulation laying down harmonized rules on artificial intelligence (Artificial Intelligence Act)[986], the first attempt by a WTO Member to introduce a measure of this type. This proposal supports the European Council objective of making the EU a global leader in the development of secure, trustworthy and ethical AI, and ensures the protection of ethical principles specifically requested by the European Parliament.[987] In October 2020 the European Council issued its Conclusions on the Charter of Fundamental Rights in the Context of Artificial Intelligence and Digital Change, calling for addressing the opacity, complexity, bias, a certain degree of unpredictability and partially autonomous behaviour of certain AI systems, to ensure their compatibility with fundamental rights and to facilitate the enforcement of legal rules.[988] The European Parliament, on the other hand, adopted a resolution that specifically recommends to the European Commission to propose legislative action to harness the opportunities and benefits for AI, but also to ensure

[983] Panel Report*, Russia - Traffic in Transit* (n 963) para 7.108.
[984] Lapa (n 974) 343.
[985] Mishra, 'The Trade: (Cyber)Security Dilemma and Its Impact on Global Cybersecurity Governance' (n 376) 579.
[986] EU Artificial Intelligence Act.
[987] ibid 1–2.
[988] ibid 2; Council of the European Union, 'Conclusions on the Charter of Fundamental Rights in the Context of Artificial Intelligence and Digital Change' (2020) 11481/20, FREMP 87, JAI 776 5.

the protection of ethical principles, and includes a text of the legislative proposal for a regulation on ethical principles for the development, deployment and use of AI, robotics and related technologies.[989] This proposal is closely linked to the Data Governance Act, the Open Data Directive, and other initiatives under the EU Strategy for Data, which will establish trusted mechanisms and services for the reuse, sharing and pulling of data that are essential for the development of data driven AI models of high-quality.[990] It also strengthens significantly the EU role in helping shape global norms and standards, and promote trustworthy AI that is consistent with EU values and interests, providing a powerful basis to engage with its external partners and at international fora on issues relating to AI.[991]

In its proposal the European Commission stated that the Artificial Intelligence Act serves a dual purpose. On the one hand, it gives people and other users the confidence to embrace AI-based solutions, while encouraging businesses to develop them, through the development of a legal framework for trustworthy AI.[992] According to the EU, rules for AI available in the Union should be human-centric, so that people can trust that the technology is used in a way that is safe and compliant with the law, including the respect of fundamental rights.[993] Since the use of AI with its specific characteristics (i.e. opacity, complexity, dependency on data, and autonomous behaviour) can adversely affect some fundamental rights enshrined in the EU Charter of Fundamental Rights, this proposal seeks to ensure a high level of protection of those fundamental rights and aims to address various sources of risks through a clearly defined a risk-based approach.[994] On the other hand, the proposal specifically aims at strengthening Europe's competitiveness and industrial basis in AI, claiming that it is in

[989] EU Artificial Intelligence Act 2; European Parliament resolution of 20 October 2020 with recommendations to the Commission on a framework of ethical aspects of artificial intelligence, robotics and related technologies (2020/2012(INL)).
[990] Proposal for a Regulation on European data governance (Data Governance Act), COM/2020/767; Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (PE/28/2019/REV/1, OJ L 172) 56; European Commission, 'A European Strategy for Data' (2020) COM/2020/66 Final; EU Artificial Intelligence Act 5.
[991] EU Artificial Intelligence Act 5.
[992] ibid 1.
[993] ibid.
[994] ibid 11.

the EU's interest to preserve its technological leadership and to ensure that Europeans can benefit from new technologies developed and functioning according to EU values, fundamental rights and principles.[995]

The EU proposal, which sets up harmonized rules for the development, placement on the market and use of AI systems in the Union following a proportionate risk-based approach, defines AI systems as "software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a give set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with".[996]

The proposal distinguishes between three types of AI systems: (1) prohibited AI systems, because they create an unacceptable risk[997]; (2) high-risk AI systems, which must comply with a set of horizontal mandatory requirements and follow conformity assessment procedures before they can be placed in the EU market.[998] They include AI systems intended to be used as a safety component of products that are subject to third-party ex-ante conformity assessment, and other stand-alone AI systems with mainly fundamental rights implications that are explicitly listed in Annex III of the Regulation (e.g. biometric identification and categorization of natural persons, education and vocational training, recruitment, and evaluate creditworthiness)[999]; (3) non-high-risk systems, for which only minimum transparency obligations are proposed, especially when chatbots or 'deep fakes' are used.[1000] The proposal imposes regulatory burdens when AI systems are likely to pose high risks to fundamental rights and safety,

[995] ibid 1, 10.
[996] The AI techniques and approaches referred in Article 3(1) are (a) machine learning, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning; (b) logic- and knowledge-based approaches, (e.g. knowledge representation, inductive programming, knowledge basis, inference and deductive engines, and expert systems) and (c) statistical approaches, Bayesian estimation, search and optimization methods. ibid 3, Article 3(1).
[997] ibid 12 (Title II).
[998] ibid 3 (Title III).
[999] ibid 13 (Article 6).
[1000] ibid 3.

as well as compliance costs.[1001] For non-high-risk AI systems only very limited transparency obligations are imposed.[1002]

The European Commission claims that, for high-risk AI systems, the requirements of high-quality data, documentation in traceability, transparency, human oversight, accuracy and reverseness are strictly necessary to mitigate the risks to fundamental rights and safety posed by AI that are not covered by other existing legal frameworks.[1003] It also states that the proposed minimum requirements are "largely consistent with other international recommendations and principles, which ensures that the proposed AI framework is compatible with those adopted by the EU's international trade partners".[1004] Standards or other technical specifications may be used to achieve compliance with the requirements set in the EU Artificial Intelligence Act.[1005]

Chapter 2 of the Regulation establishes all the requirements for high-risk AI systems, including the establishment, implementation, documentation, and maintenance of an risk management system (Article 9); training validation and testing of data based on appropriate data governance and management practices (Article 10); drawing up of technical documentation (Article 11); recordkeeping (Article 12); transparency and provision of information to users (Article 13); human oversight (article 14); development and design of AI systems that achieve an appropriate level of accuracy, robustness, and cybersecurity (Article 15). Chapter 3 establishes obligations of providers (Articles 16-28) and users (Article 29) of high-risk AI systems. The proposal imposes some restrictions on the freedom to conduct business (Article 16 of the EU Charter of Fundamental Rights) to ensure compliance with overriding reasons of public interest such as health, safety, consumer protection and the protection of other

[1001] Costs amount to €6000-7000 for the supply of an average high-risk AI system of about €170.000 by 2025. ibid 7, 10.
[1002] For example, the provision of information to flag the use of an AI system when interacting with humans. ibid 7.
[1003] ibid.
[1004] ibid 13.
[1005] ibid.

fundamental rights (responsible innovation) when high-risk AI technology is developed and used.[1006]

According to the European Commission, the Artificial Intelligence Act attempts to put in place a proportionate regulatory system centred on a well-defined risk-based regulatory approach that does not create unnecessary restrictions to trade and includes flexible mechanisms that enables it to be dynamically adapted as the technology evolves and new concerning situations emerge.[1007] However, other WTO members may find that the proposed EU regulation on AI does create unnecessary restrictions to trade and, consequently may decide to challenge its application under WTO dispute settlement rules, once it is formally adopted.

Should this potential dispute arise for an alleged violation of GATS rules, WTO adjudicators will first need to establish whether the EU proposal can be considered a "measure by Members affecting trade in services" and is thus covered by Article I:1 of the GATS. Based on the definition of 'measure' provided by Article XXIII(a) of the GATS, which explicitly lists 'regulation' among the different forms a measure can take, the Artificial Intelligence Act (once formally adopted), would fall under the broad definition of the term 'measure'. Also, because the European Union is a full-fledged member of the WTO, as a separate customs territory possessing full autonomy in the conduct of its external commercial relations (Article XII of the Marrakech Agreement) and the European Commission is a central government authority of the EU, the regulation would fall under the definition of 'measure by Members'. Third, because it sets up harmonized rules for the placing on the market, putting into service and use of AI technologies in the EU market (Article 1) and applies to both EU and non-EU service suppliers (Article 2(1)), the Regulation is a measure by a WTO Member that affects trade in services pursuant to Articles I:2 and XXVIII(c)(i) of the GATS.

However, the prohibition of the use of real-time remote biometric identification systems in publicly accessible spaces for the purpose of law enforcement (Article 5:1(d) of the EU regulation) does not fall under the scope of application of the GATS because

[1006] ibid 11.
[1007] ibid 3.

it refers to a service supplied in the exercise of governmental authority (Article I:3 of the GATS).

Once established that the measure is covered by the GATS, WTO adjudicators will have to verify whether the country has undertaken commitments in the sector at the centre of the dispute. Assuming that a WTO Member brings a dispute alleging that the requirements imposed on high-risk AI systems used for assessing students in educational institutions violate GATS rules, the Panel and the AB will have to establish whether these services fall under the board category of educational services and whether the European Union has undertaken commitments in educational services. For example, all EU member states have undertaken full liberalization under mode 1 for secondary education services, whereas Cyprus, Finland, Malta, and Sweden have undertaken no commitments. This means that Italy may be found in breach of its commitments under mode 1 for secondary education services whereas Finland may not. However, as pointed out in section 5.3.1, in some sectors the Panel and AB may find it difficult to identify whether services powered by artificial intelligence are covered by existing commitments undertaken by the EU.

If the EU Artificial Intelligence Act were to be found in violation of the EU obligations and commitments under the GATS, it is likely that the European Union will attempt to justify its measure by invoking a general exception. For example, in the explanatory memorandum attached to the proposal, the European Commission indicated that high-risk AI systems can pose a risk to the health and safety of users.[1008] Therefore, it is likely that the EU may invoke Article XIV(b) or (c) to justify the adoption of the regulation. However, even if the Panel and AB were to find the measure at issue to be provisionally justified under either exception, the EU would have to demonstrate that the measure is not applied in a manner that constitutes arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction to trade in order to fulfil the requirements of the chapeau of Article XIV of the GATS.

[1008] ibid.

5.5 Concluding remarks

From the assessment of the relationship between the GATS and artificial intelligence, with a focus on the emergence of AI-specific policies, it appears that international trade law can play a role in setting boundaries to the ability of governments to regulate AI, to the extent that efforts to govern this technology impinge on a country's commitments and obligations under the GATS. More specifically, to the extent that a Member's AI-specific policies are measures affecting trade in services, they would fall under the purview of the GATS and be subject to its general (conditional and unconditional) obligations and the Member's specific commitments.

However, a few factors may influence the scope and strength of the boundaries set by the GATS on AI governance efforts. First and foremost, not all emerging AI governance efforts are likely to fall under the scope of application of the GATS. Case in point are bans on facial recognition for law enforcement purposes and voluntary standards adopted by non-state actors that are not exercising governmental authority. Likewise, when non-binding policy instruments, like AI ethical principles, do not have normative value or are not translated into hard law rules and regulations, their coverage under the GATS may come under question.

Secondly, artificial intelligence and its application to the services sector represents a challenge both in terms of services classification and mode of supply categorization under the GATS, with significant repercussions on the identification of existing specific commitments and the subsequent operationalization of the Agreement. Indeed, while AI was first conceptualized decades before the founding of the WTO and had some limited commercial application in the 1980s, it is unclear to what extent AI-powered services can be considered as variations of existing services rather than new services and how they should be classified under the GATS Services Sectoral Classification List. Consequently, it may be difficult to ascertain whether certain AI-specific measures adopted by WTO Members are inconsistent with their specific commitments. Also, some AI applications in the services sector (e.g., autonomous vehicles or services supplying-robots) may not be easily categorised under any of the four modes of supply

currently used to define trade in services in the GATS, raising questions about their coverage under the Agreement.

The impact of AI on the concept of likeness may also weaken the role that the GATS may play in limiting governments' ability to govern AI. The complexity of the technology, compounded by the absence of a GATS-specific benchmark for the determination of likeness of services and services suppliers and by the limits to the applicability of the four criteria for likeness emerging from GATT jurisprudence, raises questions as to whether AI-powered services and AI services suppliers are 'like' foreign traditional or non-AI-powered services and, consequently, whether the AI-specific measure under challenge is in compliance with a Member's MFN or national treatment obligations under the GATS. Only if the likeness test is not met, governments would be free to introduce discriminatory trade-restrictive measures not in compliance with Article II:1 or Article XVII:1 of the Agreement.

Concerns about the application of disciplines on domestic regulation may also influence the relationship between the GATS and AI-driven regulatory autonomy. For example, while the unfulfilled mandate of Article VI:4 on domestic regulation and the wording of Article VI:5 on international standards seem to suggest that governments retain some policy space to introduce national AI-specific standards even in sectors where they undertook specific commitments, the necessity test may unduly constraint Members' efforts to regulate AI.

Another issue that may affect the ability of the GATS to put boundaries to AI governance concerns the uncertainty surrounding the coverage of services subsidies under the GATS. The unfulfilled mandate of Article XV of the GATS, the lack of a definition of subsidy in the Agreement, and the diverging opinions on the existence of disciplines addressing trade-distortive services subsidies cast doubts on the extent to which governments are allowed, under current GATS rules, to introduce AI-specific subsidies in the service sector to foster AI innovation and capitalize on the benefits accruing from the use of this technology.

Lastly, whether the GATS can limit the ability of governments to govern artificial intelligence may also depend on the exceptions that WTO Members could invoke to justify the imposition of AI-specific measures that are inconsistent with the Agreement. It is likely that governments could call on the protection of public morals (Article XIV(a)), the protection of human, animal or plant life or health (Article XIV(b)), or the need to secure compliance with certain laws and regulations relating to the prevention of deceptive and fraudulent practices, the protection of privacy and safety (Article XIV(c)) as justification. However, even if the AI-specific measures under challenge were to be provisionally justified, WTO jurisprudence suggests that governments may struggle to meet the conditions of the chapeau of Article XIV. On the other hand, it is unlikely that WTO Members could invoke the national security exception under Article XIV bis(1)(b) as a valid defence, since they may find it difficult to demonstrate that any of the three situations listed in sub-paragraphs (i)-(iii) covers the imposition of AI-specific measures restricting trade in AI-powered services.

6 Chapter - Artificial Intelligence and the Emergence of New Digital Trade Rules

6.1 Introduction

Since the founding of the WTO and the emergence of the digital economy multilateral trade rules have remained largely unchanged. Technological progress has led to significant changes in the production, sale and distribution of goods and services across borders, but world trade continues to follow a rulebook that was designed in the early 1990s, before the Fourth Industrial Revolution fully bloomed. For example, although one of the only two multilateral trade agreements to be concluded post-Uruguay Round focuses on one aspect of digital trade[1009] (i.e., the elimination of tariffs in certain IT products[1010]), Members have yet to conclude an agreement that is specifically dedicated to digital trade. Also, due largely to the stall in the Doha Round negotiations[1011], WTO members have yet to improve upon the specific commitments they inscribed in their GATS schedules at the time of accession, save for the adoption of four additional agreements (called Protocols) on specific sectors and modes (i.e., financial services, telecommunications, and movement of natural persons).

With WTO members so far failing to significantly advance rule-making on new issues through multilateral trade agreements, preferential trade agreements have become the favourite venue for the development of new disciplines on digital trade.[1012] The increase in the number of PTAs that include specific provisions or entire chapters on electronic commerce or digital trade attracted the attention of several scholars that started investigating the rationale behind the conclusion of these PTAs, the scope and

[1009] Between 1995 and 2020 the WTO Members concluded two new multilateral trade agreements, the Information Technology Agreement (ITA) in 1996 (later expanded in 2015), and the Trade Facilitation Agreement (TFA) in 2013. Information Technology Agreement (ITA), WTO doc. WT/MIN(96)/16; Information Technology Agreement II (ITA II), WTO doc. WT/MIN(15)/25.
[1010] Michael Anderson and Jacob Mohs, 'The Information Technology Agreement: An Assessment of World Trade in Information Technology Products' (2011) 3 Journal of International Commerce & Economics 109, 110.
[1011] Antoine Martin and Bryan Mercurio, 'Doha Dead and Buried in Nairobi: Lessons for the WTO' (2017) 16 Journal of International Trade Law and Policy 49.
[1012] Burri, 'Data Flows and Global Trade Law' (n 428) 15.

depth of their digital trade disciplines, and the emergence of potential different approaches to regulating certain aspects of the digital economy in international trade agreements.[1013]

However, studies exploring the treatment of artificial intelligence in preferential trade agreements are rather meagre. Existing literature on PTAs has so for largely refrained from addressing AI separately from the other emerging technologies underpinning the Fourth Industrial Revolution, focusing instead on analysing one of its core aspects, namely data and their free flows across borders.[1014] Positing that the emergence of AI-specific policies and their potential impact on trade in services warrants the need to analyse this technology as distinct and separate from others, this chapter aims at enriching the existing literature by investigating the extent to which PTAs address artificial intelligence and include provisions related to its regulation.

In order to provide some background on the reasons that led WTO Members to resort to using preferential trade agreements to advance their digital trade rule-making agenda, this chapter first offers an overview of the WTO Work Programme on Electronic Commerce, examining the role that its non-negotiating mandate played in the emergence of new rules on digital trade outside the WTO multilateral setting (Section 6.2). It then proceeds with the analysis of PTAs, including a review of the literature (Section 6.3), an examination of AI-specific disciplines and other provisions that, albeit not specifically targeted at AI, are still relevant for trade of services that employ this technology (Section 6.4). The chapter continues with a discussion of the plurilateral negotiations taking place at the WTO under the Joint Initiative on E-

[1013] Mira Burri and Rodrigo Polanco, 'Digital Trade Provisions in Preferential Trade Agreements: Introducing a New Dataset' (2020) 23 Journal of International Economic Law 187; Mark Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (ICTSD, Inter-American Development Bank 2017); Jose-Antonio Monteiro and Robert Teh, 'Provisions on Electronic Commerce in Regional Trade Agreements' (2017) WTO Staff Working Paper, ERSD-2017-11; Gao, 'Regulation of Digital Trade in US Free Trade Agreements: From Trade Regulation to Digital Regulation' (n 276); Stephanie Honey, 'Asia-Pacific Digital Trade Policy Innovation' in Ingo Borchert and Alan L Winters (eds), *Addressing Impediments to Digital Trade* (CEPR Press 2021); Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (2021) XIII Trade, Law and Development 143; Pierre Sauvé and Marta Soprana, 'The Evolution of the EU Digital Trade Policy' in Michael Hahn and Guillaume Van der Loo (eds), *Law and Practice of the Common Commercial Policy* (Brill Nijhoff 2020).
[1014] Burri, 'Data Flows and Global Trade Law' (n 428); Aaronson and Leblond (n 24).

Commerce, and their relevance for AI regulation (Section 6.5). The chapter concludes with some remarks on the potential impact of PTAs and plurilateral negotiations on AI regulation (Section 6.6).

6.2 Tackling New Issues at the WTO: The 1998 Work Programme on Electronic Commerce

Relatively soon after the conclusion of the Uruguay Round negotiations, the World Trade Organization began addressing the role new technologies could play in shaping the future of trade. Acknowledging that electronic commerce was growing and creating new opportunities for trade, during the Second Ministerial Conference, in May 1998, the WTO membership adopted a Declaration on Global Electronic Commerce that called for the creation of a work programme dedicated to the examination of all trade-related issues relating to global electronic commerce.[1015] A standing item on the agenda of the General Council since its official establishment on 25 September 1998[1016], the Work Programme on Electronic Commerce represents the earliest attempt made by WTO Members to address the emergence and impact of new technologies from a trade policy perspective.

The formal launch of the work programme also marks the first time the WTO Membership offered an explicit definition of 'electronic commerce'. For the exclusive purpose of the Work Programme on Electronic Commerce, the term means the "production, distribution, marketing, sale or delivery of goods and services by electronic means".[1017] As some scholars opine, this is a rather wide definition that encompasses almost everything.[1018] Therefore, to the extent that it impacts the production, distribution, marketing, sale or delivery of services by electronic means, artificial intelligence is likely to fall under the purview of this work programme. Some WTO publicly available documents support this view, as it emerges that a few WTO

[1015] WTO, 'Declaration on Global Electronic Commerce - Adopted on 20 May 1998 (25 May 1998)' WT/MIN(98)/DEC/2.
[1016] The General Council plays a central role in the whole process and keeps the programme under continuous review. WTO, 'WTO Doc. WT/L/274' (n 58) 1.
[1017] ibid.
[1018] Mavroidis (n 599) 233.

Members have indeed explicitly addressed artificial intelligence in the context of the work programme, albeit in very limited form. The African Group, and South Africa in particular, as well as India have begun making explicit references to AI in several communications circulated to the General Council and the Council for TRIPS since late 2017.[1019] These members appear to be particularly concerned about the potential automatic application of the GATS Schedules of Commitments negotiated during the Uruguay Round to new technologies (including AI)[1020], the impact of digitisation – spurred among others by the use of AI – on the erosion of GATT tariffs commitments and its link to the potential loss of government revenue arising from the moratorium on customs duties on electronic transmissions[1021], and the risk that, without properly addressing the digital divide, developing countries and LDCs are unable to harness and access new digital technologies (including AI).[1022]

Acknowledging the cross-cutting nature of electronic commerce and the (potential) limits of the goods/services dichotomy underpinning the existing multilateral legal framework, the WTO membership designated different bodies of the organization to carry out the activities under the Work Programme on Electronic Commerce. These are the Council for Trade in Services, the Council for Trade in Goods (CTG), the Council for TRIPS, the Committee on Trade and Development (CTD), and the General Council. [1023] Each body was tasked with examining the treatment of electronic commerce under their specific area of competence: (i) the GATS legal framework, for

[1019] WTO, General Council, 'The Work Programme on Electronic Commerce - Statement by the African Group (20 October 2017)' JOB/GC/144; WTO, 'The Work Programme on Electronic Commerce - Statement by the African Group (06 December 2017)' WT/MIN(17)/21; WTO, General Council, 'Work Programme on Electronic Commerce - The E-Commerce Moratorium and Implications for Developing Countries - Communication from India and South Africa (04 June 2019)' WT/GC/W/774; WTO, General Council, 'Work Programme on Electronic Commerce - The e-Commerce Moratorium: Scope and Impact - Communication from India and South Africa (11 March 2020)' WT/GC/W/798; WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'Intellectual Property and the 1998 Work Programme on Electronic Commerce - Operationalizing Technology Transfer in the Context of Communication from South Africa of Articles 7, 8, 40 and 66.2 of the TRIPS Agreement - Communication From South Africa (17 July 2020)' IP/C/W/665.
[1020] WTO, General Council, 'WTO Doc. JOB/GC/144' (n 1019) 2.
[1021] WTO, General Council, 'WTO Doc. WT/GC/W/774' (n 1019) 4; WTO, General Council, 'WTO Doc. WT/GC/W/798' (n 1019) 2.
[1022] WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'WTO Doc. IP/C/W/665' (n 1019).
[1023] WTO, 'WTO Doc. WT/L/274' (n 58).

the CTS; (ii) the GATT, including the provisions contained in the other good-specific annexes, such as the TBT Agreement, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), the Agreement on Rules of Origin (RoO), and the SCM Agreement, for the CTG; (iii) intellectual property rights issues, for the Council for TRIPS; and (iv) the development implications of electronic commerce, taking into account the economic, financial and development needs of developing countries, for the CTD.[1024] The General Council was tasked with examining all aspects of the work programme concerning the imposition of customs duties on electronic transmission.[1025] Thus, WTO Members recognized early on that the emerging technologies underpinning the Fourth Industrial Revolution would impact trade across multiple sectors and issue areas, and that any serious attempt to properly understand the potential legal challenges that the data-driven economy could pose for international trade law would require a comprehensive examination under all existing multilateral trade agreements, through the involvement of all the relevant WTO bodies.

However, the Work Programme on Electronic Commerce has one important limitation. It operates on a restricted mandate, a factor that may have contributed to the emergence of new rules on electronic commerce outside the WTO multilateral negotiating forum. The WTO Members created the work programme with the purpose of investigating, analysing, and discussing all trade-related aspects of e-commerce, including cross-cutting issues, rather than negotiating a multilateral trade agreement on electronic commerce. Yet, according to some scholars, the perception that no substantive progress had been achieved under the work programme since its inception in 1998 led to a migration of international rulemaking on e-commerce to PTAs.[1026] Indeed, several WTO Members that deemed it in their interest to address the emergence of electronic commerce and the challenges posed by emerging technologies on digital trade through the adoption of new rules began pursuing their objective outside the multilateral framework by introducing provisions on electronic commerce and digital trade in their PTAs. Thus, the lack of a negotiating mandate

[1024] ibid.
[1025] ibid 1.
[1026] Monteiro and Teh (n 1013) 4.

under the Work Programme on Electronic Commerce may have influenced the decision of several WTO Members to pursue rulemaking on trade-related aspects of electronic commerce through preferential trade agreements. Likewise, as suggested by several scholars, the limited mandated of the work programme on e-commerce has likely contributed to plant the seed for the plurilateral negotiations on trade-related aspects of e-commerce under the JI on E-Commerce launched at the Eleventh Ministerial Conference.[1027] For example, Gao cites "the lack of progress under the formal Work Programme" as the reason behind the desire expressed by some Members to start exploring alternative ways to advance multilateral negotiations at the WTO, including in e-commerce.[1028] Govindrajan and Singh expand on this issue by suggesting that it was the failure to convert the Work Programme initiatives into concrete solutions after the Eleventh Ministerial Conference that led to the emergence of an alternative 'plurilateral' forum for e-commerce negotiations.[1029]

Nevertheless, the WTO Members have not completely abandoned discussions under the Work Programme on Electronic Commerce. However, differences exist in the level of engagement among the four WTO bodies involved. Indeed, a quick perusal of the progress reports circulated amongst the members indicates that, after an initial period of rather meaningful discussions in the CTS, CTG, Council for TRIPS, and CTD in their respective areas of competence, activities under the work programme have languished for several years, especially in the Council for TRIPS.[1030] Yet, in the last decade WTO

[1027] WTO, 'Joint Statement on Electronic Commerce (13 December 2017)' WT/MIN(17)/60; WTO, 'Joint Statement on Electronic Commerce (25 January 2019)' WT/L/1056.
[1028] Henry S Gao, 'Across the Great Wall: E-Commerce Joint Statement Initiative Negotiation and China' (2020) SSRN Scholarly Paper 5 <https://ssrn.com/abstract=3695382> accessed 17 November 2021.
[1029] Gautami Govindrajan and Ayushi Singh, 'Curb Your Enthusiasm: The WTO E-Commerce Negotiations and the Developing World' (2021) 13 Trade Law & Development 1, 12.
[1030] Committee on Trade and Development, 'Contribution by the Committee on Trade and Development to the WTO Work Programme on Electronic Commerce - Communication from the Chairperson (15 July 1999)' WT/COMTD/19; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Information Provided to the General Council (26 July 1999)' G/C/W/158; WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'Work Programme on Electronic Commerce - Progress Report to the General Council (30 July 1999)' IP/C/18; WTO, Council for Trade in Services, 'WTO Doc. S/L/74' (n 671); WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Interim Report to the General Council (31 March 1999)' S/C/8; WTO, General Council, 'Interim Review of Progress in the Implementation of the Work Programme on Electronic Commerce - Communication from the Chairman of the Committee on Trade and Development (09 April 1999)' WT/GC/23; WTO, General Council, 'Interim Review of Progress in the Implementation of the Work Programme on Electronic

Commerce - Communication from the Chairman of the Council for Trade in Goods (12 April 1999)' WT/GC/24; WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'Work Programme on Electronic Commerce - Progress Report by the Chairman to the General Council (4 December 2000)' IP/C/20; Committee on Trade and Development, 'Work Programme on Electronic Commerce - Contribution by the Committee on Trade and Development - Report by the Chairman (13 November 2000)' WT/COMTD/26; WTO, Council for Trade in Goods, 'Chairman's Factual Progress Report to the General Council on the Work Programme on Electronic Commerce (24 November 2000)' G/L/421; WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'Work Programme on Electronic Commerce - Report to the General Council (02 July 2003)' IP/C/29; WTO, Council for Trade in Goods, 'Report to the General Council on the Work Programme on Electronic Commerce (09 July 2003)' G/L/635; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Note by the Chairman of the Council for Trade in Services to the General Council (09 July 2003)' S/C/18; WTO, General Council, 'Work Programme on Electronic Commerce - Dedicated Discussions under the Auspices of the General Council - Report to the 17 November 2009 Meeting of the General Council (09 November 2009)' WT/GC/W/613; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (30 June 2011)' S/C/35; WTO, General Council, 'Work Programme on Electronic Commerce - Dedicated Discussions under the Auspices of the General Council - Draft Report to the 30 November 2011 Meeting of the General Council (18 November 2011)' WT/GC/W/645; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Goods to the General Council (03 December 2012)' G/C/50; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (06 July 2012)' S/C/38; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (10 December 2012)' S/C/40; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Goods to the General Council (11 July 2012)' G/C/49; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (04 July 2013)' S/C/41; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Goods to the General Council (15 July 2013)' G/C/53; WTO, General Council, 'Work Programme on Electronic Commerce - Dedicated Discussions under the Auspices of the General Council - Report to the 21 November 2013 Meeting of the General Council (11 November 2013)' WT/GC/W/676; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (02 July 2014)' G/C/54; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (30 June 2014)' S/C/43; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (08 December 2014)' S/C/45; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress (08 December 2014)' WT/GC/W/692; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (25 November 2014)' G/C/55; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (17 July 2015)' S/C/47; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress - Report by Ambassador Alfredo Suescum - Friend of the Chair (24 July 2015)' WT/GC/W/701; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (10 July 2015)' G/C/56; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress - Report by Ambassador Alfredo Suescum - Friend of the Chair (01 August 2016)' WT/GC/W/721; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (02 December 2016)' S/C/51; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (20 July 2016)' G/C/57; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress - Report by the Chairman (08 December 2016)' WT/GC/W/728; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report

Members have repeatedly confirmed their intention to continue to work under the Work Programme on Electronic Commerce, based on its existing mandate set out in document WT/L/274.[1031]

6.3 Regulating Digital Trade in Preferential Trade Agreements

A growing body of scholarly work has addressed digital trade rule-making in PTAs. Some studies have focused on the identification and classification of provisions on electronic commerce and digital trade included in these agreements.[1032] Others have

by the Chairman of the Council for Trade in Services to the General Council (11 July 2016)' S/C/49; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (25 November 2016)' G/C/58; WTO, General Council, 'Work Programme on Electronic Commerce - Report by the Chairman (01 December 2017)' WT/GC/W/739; WTO, Council for Trade-Related Aspects of Intellectual Property Rights, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for TRIPS to the General Council (13/ July 2017)' IP/C/77; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (19 July 2017)' S/C/52; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (21 July 2017)' G/C/59; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (17 July 2018)' G/C/60; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (10 December 2018)' S/C/56; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress - Report by the Chairman (17 December 2018)' WT/GC/W/756; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (04 December 2019)' S/C/58; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (18 July 2019)' G/C/65; WTO, General Council, 'Work Programme on Electronic Commerce - Review of Progress - Report by the Chairperson (25 July 2019)' WT/GC/W/780; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (11 July 2019)' S/C/57; ibid; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (27 November 2019)' G/C/66; WTO, Council for Trade in Goods, 'Work Programme on Electronic Commerce - Report by the Chairperson of the Council for Trade in Goods to the General Council (04 December 2020)' G/C/67; WTO, Council for Trade in Services, 'Work Programme on Electronic Commerce - Report by the Chairman of the Council for Trade in Services to the General Council (07 December 2020)' S/C/61.

[1031] WTO, 'Work Programme on Electronic Commerce - Decision of 2 December 2009 (11 December 2009)' WT/L/782; WTO, 'Work Programme on Electronic Commerce - Decision of 17 December 2011 (19 December 2011)' WT/L/843; WTO, 'Work Programme on Electronic Commerce - Ministerial Decision of 7 December 2013 (11 December 2013)' WT/MIN(13)/32; WT/L/907; WTO, 'Work Programme on Electronic Commerce - Ministerial Decision of 19 December 2015 (21 December 2015)' WT/MIN(15)/42; WT/L/977; WTO, 'Work Programme on Electronic Commerce - Ministerial Decision of 13 December 2017 (18 December 2017)' WT/MIN(17)/65; WT/L/1032; WTO, 'Work Programme on Electronic Commerce - General Council Decision - Adopted on 10 December 2019 (11 December 2019)' WT/L/1079.

[1032] Monteiro and Teh (n 1013); Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013); Burri and Polanco (n 1013).

examined the conclusion of PTAs containing digital trade disciplines from a political economy perspective.[1033] A few scholars have limited their analysis to individual PTAs or signatories, often drawing comparisons across sub-sets of agreements.[1034] Others have focused their analytical efforts on specific issues (e.g. cross-border data flows, source code, privacy and data protection).[1035] Overall, it emerges that PTAs have increasingly acted as "laboratories in which to experiment with and adopt elements of a nascent regulatory regime governing electronic transactions and digital trade".[1036]

Empirical work carried out using data from the WTO repository of Regional Trade Agreements (RTAs)[1037] and the Design of Trade Agreements (DESTA) database[1038] found that PTAs have undergone a quantitative and qualitative evolution in the last two decades.[1039] ANZSCEP, the Closer Economic Partnership Agreement signed by New Zealand and Singapore in 2000, marks the first time electronic commerce was addressed in a PTA, with the inclusion of Article 12 on paperless trading.[1040] Since then the number of agreements covering electronic commerce and digital trade has grown exponentially. Over half of all 346 PTAs concluded between 2000 and October 2019 include provisions that are related to digital trade, about one third have specific e-commerce provisions, and 78 contain dedicated e-commerce chapters and side

[1033] Andrew D Mitchell and Neha Mishra, 'Digital Trade Integration in Preferential Trade Agreements' (ESCAP 2020) ARTNeT Working Paper Series N. 191.
[1034] Sacha Wunsch-Vincent and Arno Hold, 'Toward Coherent Rules for Digital Trade: Building on Efforts in Multilateral versus Preferential Trade Negotiations' in Mira Burri and Thomas Cottier (eds), *Trade Governance in the Digital Age: World Trade Forum* (Cambridge University Press 2012); Henry Gao, 'Digital or Trade? The Contrasting Approaches of China and US to Digital Trade' (2018) 21 Journal of International Economic Law 297; Gao, 'Regulation of Digital Trade in US Free Trade Agreements: From Trade Regulation to Digital Regulation' (n 276); Wolfe (n 26); Sauvé and Soprana (n 1013); Honey (n 1013); Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013); Mira Burri, 'Adapting Trade Rules for the Age of Big Data' in Antony Taubman and Jayashree Watal (eds), *Trade in Knowledge: Economic, Legal and Policy Aspects* (Cambridge University Press Forthcoming).
[1035] Burri, 'Data Flows and Global Trade Law' (n 428); Irion (n 34).
[1036] Sauvé and Soprana (n 1013) 285.
[1037] World Trade Organization, 'Regional Trade Agreements Database' <https://rtais.wto.org/UI/PublicMaintainRTAHome.aspx> accessed 15 September 2021.
[1038] 'Design of Trade Agreements (DESTA) Database' (*DESTA*) <https://www.designoftradeagreements.org/> accessed 15 September 2021.
[1039] Monteiro and Teh (n 1013).
[1040] Agreement on a Closer Economic Partnership, N.Z.-Sing., Nov. 14, 2000, [2001] NZTS.

agreements.[1041] Notably, in comparison to earlier agreements, PTAs signed in the late 2010s are more prone to include provisions on digital trade. Indeed, whilst all PTAs concluded in 2018 and 2019 contain disciplines on digital trade, only 10 per cent of all the agreements concluded in 2000 do.[1042]

Noticeable changes occurred also in relation to the location of digital trade disciplines in PTAs. While those signed in the early 2000s contained a few provisions on electronic commerce scattered across the text of the agreement (e.g. ANZSCEP, and the EU-Chile Free Trade Agreement[1043]), most PTAs signed in the 2010s include sections on electronic commerce within the chapters on cross-border trade in services (e.g. EU-Japan Economic Partnership Agreement)[1044], or entire chapters devoted to electronic commerce or digital trade (e.g. the Comprehensive Economic and Trade Agreement (CETA) [1045], the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) [1046], and the Regional Comprehensive Economic Partnership (RCEP) [1047]). The Digital Economy Partnership Agreement (DEPA)[1048] represents the latest evolution. Signed in 2020 by Chile, New Zealand, and Singapore, it is the first stand-alone agreement entirely dedicated to trade in the digital economy.[1049]

Some scholars have found that the number and level of detail of electronic commerce provisions has increased significantly over the years.[1050] For example, the EU-

[1041] The dataset used by Burri and Polanco for their comprehensive quantitative analysis includes four types of PTAs: (i) currently in force and notified to the WTO; (ii) not yet notified; (ii) signed but not yet in force; and (iv) agreements for which the negotiation has been completed and the text made available. Monteiro and Teh limited their analysis to the PTAs that, at the time (May 2017), had been in force and already notified to the WTO as of May 2017. Burri and Polanco (n 1013) 192. See also Monteiro and Teh (n 1013) 5.
[1042] Burri, 'Data Flows and Global Trade Law' (n 428) 22.
[1043] Agreement establishing an association between the European Community and its Member States, of the one part, and the Republic of Chile, of the other part - Final act, 2002 O.J. (L352).
[1044] Agreement for an Economic Partnership, EU-Japan, 2018 O.J. (L 330).
[1045] Comprehensive Economic and Trade Agreement, Can.-E.U, Oct. 30, 2016, 2017 O.J. (L 11).
[1046] Comprehensive and Progressive Agreement for Trans-Pacific Partnership, Mar. 8, 2018, [2018] ATS 23, https://www.dfat.gov.au/trade/agreements/in-force/cptpp/comprehensive-and-progressive-agreement-for-trans-pacific-partnership.
[1047] Regional Comprehensive Economic Partnership Agreement (RCEP), Nov. 15, 2020, [2020] ATNIF 1, https://www.dfat.gov.au/trade/agreements/not-yet-in-force/rcep.
[1048] Digital Economy Partnership Agreement, Chile-N.Z.-Sing., June 11, 2020, [2020] NZTS.
[1049] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 151.
[1050] Monteiro and Teh (n 1013) 6–8; Burri and Polanco (n 1013) 195.

CARIFORUM Economic Partnership Agreement (EPA)[1051], which was signed in 2008, has two articles specifically dedicated to electronic commerce, whereas one of the most recent PTAs signed by the EU with Japan[1052] has twelve such articles. Similar observations can be drawn with respect to the length of chapters on electronic commerce. Cases in point are CETA, signed in 2013, whose Chapter 16 includes only seven articles, and RCEP, concluded in 2020, whose Chapter 12 contains seventeen articles. These observations are supported by Burri and Polanco, who found that "as of October 2019, 835 is the average number of words found in e-commerce chapters and side agreements, with an average number of 1476 words in the last five years".[1053] Additionally, the average number of articles on electronic commerce per agreement has risen over time, from one in 2000 to thirteen in 2019, followed by an increase in average number of words per article, from 91 in 2000 to 2527 words in 2019.[1054]

Likewise, the length of individual provisions has also evolved over time. For instance, Article 12 of ANZSCEP on paperless trading is 55 words long and simply calls for the creation of an electronic environment to implement the Paperless Trading Initiative of the APEC Blueprint for Action on Electronic Commerce. However, Article 2.2 of DEPA, which was concluded 20 years later, is ten times longer and covers a wider range of issues including the establishment of a single window, the facilitation of exchange of data relating to sanitary and phytosanitary certificates, and the exchange of best practices.

Anecdotal evidence suggests that time also plays a role with respect to the scope of individual provisions. In earlier PTAs signatories called for cooperation in electronic commerce in areas such as the recognition of certificates of electronic signatures issued to the public and the facilitation of cross-border certification services, the liability of intermediary service providers, the treatment of unsolicited electronic

[1051] Economic Partnership Agreement between the CARIFORUM States, of the one part, and the European Community and its Member States, of the other part, 2008 O.J. (L 289/I/3).
[1052] EU-Japan EPA.
[1053] Burri and Polanco (n 1013) 195.
[1054] Burri, 'Data Flows and Global Trade Law' (n 428) 23.

commercial communications, and consumer protection.[1055] However, PTAs concluded since 2015 show a widening of areas of potential cooperation, with the inclusion of themes such as cybersecurity, financial technology, open government data, SMEs, personal information protection, data innovation, artificial intelligence, e-invoicing, trade facilitation, and digital identity.[1056]

Existing literature also provides useful insights on the level of development and geographical origin of members of PTAs that contain disciplines on digital trade.[1057] In their empirical studies Monteiro, Teh, Burri and Polanco found that, even if the first agreement to contain a provision on electronic commerce was signed by two developed countries (i.e. New Zealand and Singapore), most PTAs with rules on digital trade or electronic commerce were negotiated between developed and developing countries (North-South PTAs), and over one third between developing countries (South-South PTAs), leaving only a handful of agreements to fall under the category of North-North PTAs, i.e. negotiated between developed countries.[1058]

Overall, most of the countries that participated in the negotiation of PTAs that include provisions on digital trade hail from North America, Europe, and the Asia Pacific. The latter region, especially, seems to be taking a leading role in the development of digital trade rules in recent years, as demonstrated by the conclusion of the CPTPP, RCEP, the DEPA, the EU-Vietnam Free Trade Agreement[1059], the EU-Japan EPA, the US-Japan Digital Trade Agreement (DTA)[1060], and the Digital Economy Agreement between Australia and Singapore (DEA), as well as the ongoing negotiations of a Digital

[1055] Free trade Agreement between the European Union and its Member States, of the one part, and the Republic of Korea, of the other part, 2011 O.J. (L 127) Article 7.49.
[1056] DEPA Article 5.1, 7.1, 8.1, and 9.5; RCEP Article 12.4; Australian Government Department of Foreign Affairs and Trade, Australia-Singapore Digital Economy Agreement, 2020, https://www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 148.
[1057] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 148.
[1058] Monteiro and Teh (n 1013) 6; Burri and Polanco (n 1013) 194.
[1059] Free Trade Agreement between the European Union and Vietnam, 2019 O.J. (L 177).
[1060] Agreement Between the United States of America and Japan Concerning Digital Trade, 8 October 2019.

Partnership Agreement between South Korea and Singapore.[1061] The number of PTAs covering digital trade that have been concluded by African countries remains very limited.

Anecdotal evidence suggests that advanced economies tend to demand rather robust e-commerce chapters of their RTA partners whereas developing countries are more reluctant to agree to such provisions.[1062] For instance, while the most detailed agreement entirely devoted to digital trade, the DEPA, was negotiated by three OECD members[1063], emerging economies like Brazil, India and South Africa have so far refrained from signing PTAs with far-reaching provisions on digital trade.[1064] However, advanced economies and developing countries should not be treated as monoliths, as differences emerge across regions and income levels on the scope and depth of digital trade disciplines.[1065] For example, contrary to what one would expect, two developing countries (Costa Rica and Colombia) signed an FTA in 2013 containing a chapter on electronic commerce that is more extensive than the 'light-touch' rules the EU, an advanced economy, agreed upon with Vietnam, a lower middle-income country.[1066]

Evidence points to the existence of marked differences among PTAs, both across and within regions, on the scope and depth of the disciplines on digital trade. For instance, DEPA introduced a whole set of other issues (e.g., emerging trends and technologies, innovation and the digital economy and digital inclusion) that are not usually covered in PTAs but are starting to appear in the digital economy agreements negotiated by one of its signatories, Singapore. One the other hand, rules prohibiting the forced transfer, disclosure or access to source code as a condition for market access appear

[1061] Singapore Ministry of Trade and Industry (n 142).
[1062] Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013) 6.
[1063] Chile, New Zealand and Singapore.
[1064] India participated in the RCEP negotiations but back out of signing the agreement arguing that a few outstanding issues prevented it from staying onboard. 'Joint Leaders' Statement on the Regional Comprehensive Economic Partnership (RCEP)' <https://rcepsec.org/wp-content/uploads/2019/11/FINAL-RCEP-Joint-Leaders-Statement-for-3rd-RCEP-Summit.pdf> accessed 20 September 2021; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 150.
[1065] Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013) 6.
[1066] ibid 7.

primarily in PTAs negotiated by Japan (e.g. Article 14.7 of CPTPP, Article 8.73 of EU-Japan EPA, and Article 9.11 of the Japan-Mongolia EPA[1067]), the US (e.g. Article 14.17 CPTPP, and Article 19.16 of USMCA[1068]), and in some of those concluded most recently by the UK (e.g. Article 207 of the Trade and Cooperation Agreement between the EU and the United Kingdom)[1069], while PTAs signed by the EU are likely to include a provision on the principle of 'no prior authorization'[1070], an issue that is largely absent in PTAs which the US is a party to.

In some cases, WTO Members have approached the same issue rather differently. Case in point are disciplines on cross-border data flows. According to Aaronson, the US, the EU and China have adopted three contrasting strategies to data governance.[1071] More specifically, while the US focus on including (binding) provisions forbidding the imposition of barriers to the unfettered flow of data across borders, the EU is creating a template for PTAs that cover digital trade that conditions the cross-border flow of data on the protection of personal data, which it considers a fundamental right.[1072] China's approach to restricting the free flow of information both across and within its borders for national security reasons is reflected in its PTAs, which do not include binding rules on data flows limiting digital protectionism.[1073] For example, one of the most recent PTAs negotiated by China, RCEP, contains a provision (Article 12.15) that allows its signatories to adopt measures restricting the cross-border flow of data if necessary to protect their essential security interest. Since RCEP does not allow other signatories to dispute these measures nor offers any further

[1067] Agreement between Japan and Mongolia for an Economic Partnership, Feb. 10, 2015, https://www.mofa.go.jp/files/000067716.pdf.
[1068] Agreement between the United States of America, the United Mexican States, and Canada, July 1, 2020, https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between.
[1069] Trade and Cooperation Agreement between the European Union and the European Atomic Energy Community, of the one part, and the United Kingdom of Great Britain and Northern Ireland, of the other part, 2021 O.J. (L149).
[1070] According to the principle of 'no prior authorization', the supply of services by electronic means should not be subject to prior authorisation requirements specifically and exclusively targeting services provided by electronic means. WTO, 'Joint Statement on Electronic Commerce - Establishing an Enabling Environment for Electronic Commerce - Communication from the European Union (16 May 2018)' JOB/GC/188 4.
[1071] Aaronson and Leblond (n 24) 247.
[1072] ibid 262; Sauvé and Soprana (n 1013) 296.
[1073] Aaronson and Leblond (n 24) 247, 268.

explanation of what would constitute an 'essential security interest', the agreement leaves ample policy space to its parties to limit the unfettered flow of data across borders.[1074]

Notwithstanding the high heterogeneity in the nature of the provisions and depth of commitments[1075], several studies found a certain degree of convergence among PTAs with respect to issue coverage. Indeed, with increasing frequency, digital trade or electronic commerce chapters include calls for a moratorium on the imposition of customs duties on electronic transmissions; provisions on cooperation on e-commerce; disciplines on data and consumer protection regulations; rules on paperless trade, electronic authentication, and digital signatures; provisions on cross-border data flows and data localisation; and definitions of e-commerce and digital products.[1076]

6.4 Artificial Intelligence-related Disciplines in PTAs

6.4.1 AI-specific disciplines

Before the conclusion of the DEPA, no PTA had ever included a provision that explicitly referred to artificial intelligence. Couched in best endeavour language, Article 8.2 of the agreement states that:

> *"1. The Parties recognise that the use and adoption of Artificial Intelligence (AI) technologies have grown increasingly widespread in the digital economy.*
>
> *2. The Parties recognise the economic and social importance of developing ethical and governance frameworks for the trusted, safe and responsible use of AI technologies. In view of the cross-border nature of the digital economy, the Parties further acknowledge the benefits of developing*

[1074] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 156.
[1075] Burri, 'Data Flows and Global Trade Law' (n 428) 20.
[1076] Monteiro and Teh (n 1013); Burri and Polanco (n 1013); Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013); Sauvé and Soprana (n 1013); Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013).

mutual understanding and ultimately ensuring that such frameworks are internationally aligned, in order to facilitate, as far as possible, the adoption and use of AI technologies across the Parties' respective jurisdictions.

3. To this end, the Parties shall endeavour to promote the adoption of ethical and governance frameworks that support the trusted, safe and responsible use of AI technologies (AI Governance Frameworks).

4. In adopting AI Governance Frameworks, the Parties shall endeavour to take into consideration internationally recognised principles or guidelines, including explainability, transparency, fairness and human-centred values."

This article is particularly significant for three reasons. First, it marks the first time an international trade agreement includes a provision specifically dedicated to one of the several technologies underpinning the XXI century digital revolution. Indeed, the IoT and blockchain, for example, have yet to be explicitly mentioned or singled out in a PTA provision or chapter. Secondly, it signals that the DEPA signatories consider AI worthy of specific attention and understand the importance of establishing an ethical and governance framework that can best respond to the needs and challenges that emerge from the increasingly widespread application of this technology. Lastly, it also marks the first time a trade agreement explicitly refers to the AI principles or guidelines that are increasingly being developed and recognized at international level.

Following in the DEPA's footsteps, other international trade agreements have started to address AI with provisions specifically dedicated to this technology. Case in point is the DEA between Australia and Singapore, which was concluded a few months after the agreement between Chile, New Zealand, and Singapore, and which replaces the existing Electronic Commerce chapter of the Singapore-Australia Free Trade Agreement (SAFTA) with a new Digital Economy chapter.[1077] Like the DEPA, the DEA

[1077] Unlike DEPA, the DEA between Australia and Singapore is not a standalone agreement, albeit it was negotiated as such. 'Australia-Singapore Digital Economy Agreement: Fact Sheet' (*Australian Government Department of Foreign Affairs and Trade*, 8 December 2020) <https://www.dfat.gov.au/trade/services-and-digital-trade/australia-singapore-digital-economy-agreement-fact-sheet> accessed 20 September 2021.

contains an article on artificial intelligence, albeit with some notable differences. Article 31 of DEA reads:

> *"1. The Parties recognise that the use and adoption of Artificial Intelligence ("AI") technologies are becoming increasingly important within a digital economy offering significant social and economic benefits to natural persons and enterprises. The Parties shall cooperate, in accordance with their respective relevant policies, through:*
>
> *(a) sharing research and industry practices related to AI technologies and their governance;*
>
> *(b) promoting and sustaining the responsible use and adoption of AI technologies by businesses and across the community; and*
>
> *(c) encouraging commercialisation opportunities and collaboration between researchers, academics and industry.*
>
> *2. The Parties also recognise the importance of developing ethical governance frameworks for the trusted, safe and responsible use of AI technologies that will help realise the benefits of AI. In view of the cross-border nature of the digital economy, the Parties further acknowledge the benefits of ensuring that such frameworks are internationally aligned as far as possible.*
>
> *3. To this end, the Parties shall endeavour to:*
>
> *(a) collaborate on and promote the development and adoption of frameworks that support the trusted, safe, and responsible use of AI technologies ("AI Governance Frameworks"), through relevant regional and international fora; and*
>
> *(b) take into consideration internationally-recognised principles or guidelines when developing such AI Governance Frameworks."*

Article 31 of the DEA differs from Article 8.2 of the DEPA in three key aspects. First, while the latter referred to the 'widespread' use of AI in the digital economy, Article 31(1) of the DEA gives prominence to how 'important' AI has become within the digital economy, highlighting the significant social and economic benefits that accrue to both people and firms from its increasing use. This change in language may be interpreted as an attempt from Australia and Singapore to offer a more forthright explanation for their decision to spotlight and distinguish this technology from others through the inclusion of an explicit AI-specific provision in their agreement.

Secondly, Article 31 of the DEA calls on the Parties to cooperate on AI through a variety of tools, including the sharing of best practices related to AI and its governance, increased collaboration between researchers, academics and industry, and the promotion of responsible use and adoption of AI technologies. However, Article 8.2 of the DEPA does not explicitly address the issue of cooperation.

Lastly, the DEPA and the DEA each address the issue of AI governance in somewhat distinct manners, as evidenced by small differences in language and content of the relevant provision. In both agreements the parties describe 'AI Governance Frameworks' as those that support the trusted, safe, and responsible use of AI technologies, acknowledge the role that they play in helping realize the benefits of AI, and recognise the importance of ensuring that such frameworks are internationally aligned as far as possible. However, while Article 8.2 of the DEPA provides an indicative list of internationally recognized principles and guidelines that must be taken into consideration when developing AI governance frameworks, Article 31 of the DEA refrains from doing so. On the other hand, the agreement between Australia and Singapore specifies that the parties endeavour to promote these frameworks through relevant regional and international fora, a provision that is absent in the DEPA.

Notably, the DEA offers no further clarifications on what entities would fall under the meaning of the term 'relevant regional or international fora'. One could argue that this could leave fairly ample space of manoeuvre to the two governments because efforts to design AI Governance Frameworks are in the early stages of development and are taking place in a wide variety of settings (e.g., OECD, GPAI). On the other hand, one

could counter that not many entities currently involved in the development of AI Governance Frameworks, besides the OECD, might be considered 'relevant international fora' for the purposes of Article 31(3) of the DEA, thus limiting the choice of venue where to engage in the development and promotion of such frameworks.

Also, while the DEPA calls on the parties to "promote the adoption" of AI Governance Frameworks, Article 31(3) DEA invites its Signatories to "collaborate on and promote the development and adoption" of such frameworks. Again, it appears that Australia and Singapore place greater value on cooperation than the parties to DEPA.

Notwithstanding their differences, Article 8.2 of the DEPA and Article 31 of the DEA share a common trait. As regards the adoption of AI Governance Frameworks, both provisions are couched in 'best endeavour' language. Thus, neither can be considered as a binding commitment to develop such frameworks: both should be viewed as a signalling tool, instead.[1078]

It is likely that the DEPA and the DEA could serve as templates for future PTAs where the parties are interested in including AI-specific provisions, especially for negotiations of bilateral agreements involving Asia-Pacific countries. As a matter of fact, the government of Singapore has announced its intention to embark on the negotiation of a series of digital economy agreements, starting with a Digital Partnership Agreement with Korea (KSDPA) and a Digital Economy Agreement with the United Kingdom (UKSDEA).[1079] In its official press release on the launch of the KSDPA negotiations the Singapore Ministry of Trade and Industry explained that the agreement seeks to deepen bilateral cooperation in new emerging digital areas, including in AI governance frameworks.[1080] Likewise, in announcing the formal launch of the UKSDEA negotiations,

[1078] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 161.
[1079] 'Launch of Negotiations for the Korea Singapore Digital Partnership Agreement' (*Ministry of Trade and Industry Singapore*, 22 June 2020) <https://www.mti.gov.sg/Newsroom/Press-Releases/2020/06/Launch-of-Negotiations-for-the-Korea-Singapore-Digital-Partnership-Agreement> accessed 17 September 2021; 'Singapore and the United Kingdom Launch Negotiations on the Digital Economy Agreement' (*Ministry of Trade and Industry Singapore*, 28 June 2021) <https://www.mti.gov.sg/Newsroom/Press-Releases/2021/06/Singapore-and-the-United-Kingdom-launch-negotiations-on-the-Digital-Economy-Agreement> accessed 21 September 2021.
[1080] 'Launch of Negotiations for the Korea Singapore Digital Partnership Agreement' (n 1079).

the Ministry affirmed that the agreement sought to explore the use of emerging and innovative technologies such as AI as a way to make it easier to do business digitally between the UK and Singapore.[1081]

The UK government had already mentioned artificial intelligence in its Draft Working Text for a Comprehensive Free Trade Agreement with the European Union (CAFTA) of May 2020.[1082] Under the definition of 'emerging technology' Article 8.2 of the UK proposal read:

> *"[A]n enabling and innovative technology that has potentially significant application across a wide range of existing and future sectors. Current examples may include, but are not limited to:*
>
> *(a) artificial intelligence;*
>
> *(b) distributed ledger technologies;*
>
> *(c) quantum technologies;*
>
> *(d) immersive technologies; and*
>
> *(e) internet of things."*[1083]

This would have been the first time the term AI would be mentioned explicitly in a PTA concluded by the EU. However, this provision was left out of the final text of the EU-UK Trade and Cooperation Agreement (TCA) that was concluded in April 2021.[1084] Other key players in the race to become leaders in the development of artificial intelligence, China and the US, have yet to include in their PTAs any provisions akin to

[1081] 'Singapore and the United Kingdom Launch Negotiations on the Digital Economy Agreement' (n 1079).
[1082] UK Government (n 81).
[1083] The proposed Article 8.2 contained a list of definitions for the purposes of the Title on Services and Investment as well as the Title on Regulatory Approaches on Services, which included a proposed chapter on digital trade (Chapter 18).
[1084] EU-UK TCA.

those found in the DEPA and the DEA that are specifically dedicated to this technology, although China has recently applied to join DEPA.[1085]

6.4.2 Disciplines non-specific to AI

As mentioned in previous chapters, artificial intelligence is based on the interrelation of three key components, namely data, algorithms, and computing power. Therefore, any provision contained in PTAs that targets any of these three elements could affect services that rely on AI, even if the rationale behind the design and adoption of said provision can be ascribed to reasons other than the need to address issues related to the widespread use of AI in the digital economy.

Notably, this chapter focuses on those non-AI-specific disciplines that appear in the chapters and sections of PTAs specifically dedicated to electronic commerce and digital trade. Whilst this study acknowledges that governments may have introduced new rules that could have significant implications for AI and its application in the services sector also in other chapters (for example in relation to the protection of intellectual property or trade in micro-processors), the analysis of these potential new disciplines falls outside the scope of this research.

Overall, there are several types of new non-AI-specific rules introduced in PTAs that are still relevant or could significantly impact the development and use of AI, and governmental efforts to regulate this technology: (i) disciplines on cross-border data flows; (ii) disciplines on source code; and (iii) disciplines on consumer protection, non-discrimination of digital products, cybersecurity, domestic regulation, and cooperation.

6.4.2.1 Disciplines on cross-border data flows

As mentioned in Chapter 3, data localisation requirements are a key barrier to trade in the digital era that may also affect trade in services that are powered by AI. Limits to the free flow of data across borders can impact the accessibility of AI software developers to the large quantity of high-quality data necessary to train AI machines.

[1085] Reuters, 'China Applies to Join Digital Economy Partnership Agreement' *Reuters* (1 November 2021) <https://www.reuters.com/world/china/china-applies-join-digital-economy-partnership-agreement-2021-11-01/> accessed 4 November 2021.

They also impinge on the ability of AI systems to effectively function, by placing constraints on their ability to process data. As a result, governments have started to introduce disciplines in PTAs aimed at addressing this type of trade-restrictive measures. Overall, there are four types of provisions related to the treatment of data that can be relevant from an AI perspective: (i) disciplines on cross-border data flows or transfer of information; (ii) prohibitions or limitations of data localisation requirements; (iii) disciplines on personal data protection; and (iv) provisions on open government data.

According to the Trade Agreements Provisions on Electronic-commerce and Data (TAPED) database, over thirty PTAs contain a provision on cross-border flows of data or transfer of information.[1086] Notably, differences in terminology exist across PTAs. Some agreements, especially in the Asia-Pacific Region, refer to the 'cross-border transfer of information by electronic means'[1087] or the 'movement of information'[1088] The European Union typically refers to the 'free flow of data'[1089], 'cross-border data flows'[1090], or 'data flows'[1091]. Thus, as Burri notes, "there seems to be a tendency for a broad and encompassing definition of data flows (1) where there are bits of information (data) as part of the provision of a service or a product and (2) where this data crosses borders" [1092], although the geography of data flows differs from the geography of trade flows.[1093]

The scope and depth of disciplines on cross-border flows of data vary across time and PTAs. Non-binding provisions appeared as early as 2000, when Jordan and the US highlighted the "need to continue the free flow of information" in their Joint Statement

[1086] Universität Luzern, 'TAPED: A New Dataset on Data-Related Trade Provisions' (*University of Lucerne*) <https://www.unilu.ch/en/faculties/faculty-of-law/professorships/managing-director-internationalisation/research/taped/> accessed 2 November 2021.
[1087] USMCA Article 19.11; RCEP Article 12.15; CPTPP Article 14.11; DEPA Article 4.3.
[1088] Australia - Hong Kong Free Trade Agreement, 26 March 2019 Article 11.7.
[1089] E.g. EU-Japan EPA Article 8.81.
[1090] E.g. EU-UK TCA Article 201.
[1091] E.g. Decision No 2/2001 of the EU-Mexico Joint Council of 27 February 2001 implementing Articles 6, 9, 12(2)(b) and 50 of the Economic Partnership, Political Coordination and Cooperation Agreement (OJ L 70), 2001 Article XX.
[1092] Burri, 'Data Flows and Global Trade Law' (n 428) 25.
[1093] OECD, 'Trade and Cross-Border Data Flows' (2019) OECD Trade Policy Briefing 1.

on Electronic Commerce, but refrained from including an explicit provision in this regard in their FTA.[1094] It took another six years for an FTA to explicitly mention cross-border flows of information in an article for the first time.[1095] The first binding commitment on cross-border data flows - though couched in 'best endeavour' language - was included a year later, in 2007, in the free trade agreement between Korea and the United States (KORUS FTA), with the Parties agreeing to "endeavour to refrain from imposing or maintaining unnecessary barriers to electronic information flows across border" (Article 15.8).[1096]

Over time several PTAs have started to include stronger commitments on cross-border data flows, albeit significant differences emerge across them. Some recent agreements support the unfettered flow of data across borders, permitting restrictions to the cross-border transfer of information by electronic means - including personal information - only in order to achieve a legitimate policy objective, provided that these measures are not applied in manner which would constitute a disguised restriction to trade or a means of arbitrary or unjustifiable discrimination, and do not impose restrictions on the transfer of information greater than are required to achieve the objective.[1097] In a few PTAs the parties introduced an additional exception establishing that the parties can adopt or maintain any measure restricting the cross-border transfer of information by electronic means if they considered it necessary for the protection of their essential security interests.[1098] Notably, in RCEP the Parties added two further qualifiers that leave ample margin of discretion on the legal interpretation of this provision and leave

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[1094] 'US-Jordan Joint Statement on Electronic Commerce' <http://sice.oas.org/Trade/us-jrd/St.Ecomm.pdf>; Burri, 'Data Flows and Global Trade Law' (n 428) 26.

[1095] In their 2006 FTA, Taiwan and Nicaragua affirmed the importance of "working to maintain cross-border flows of information as an essential element in fostering a vibrant environment for electronic commerce" (Article 14.05).

[1096] Korea - United States Free Trade Agreement (Final text as of 1 January 2019), https://ustr.gov/trade-agreements/free-trade-agreements/korus-fta/final-text.

[1097] *E.g.* CPTPP Article 14.11; Australia-Singapore DEA Article 23; DEPA Article 4.3; USMCA 19.11; Japan-US DTA Article 11; Indonesia-Australia Comprehensive Economic Partnership Agreement, 4, March 2019, https://www.dfat.gov.au/trade/agreements/in-force/iacepa/iacepa-text/Pages/default Article 13.11; Peru-Australia Free Trade Agreement, 12 February 2018, https://www.dfat.gov.au/trade/agreements/in-force/pafta/full-text/Pages/fta-text-and-associated-documents Article 13.11; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 156.

[1098] Indonesia-Australia CEPA Article 13.11(3)(b); RCEP Article 12.15(3)(b).

the door open for the potential abuse and misuse of the security exception.[1099] They affirmed that it is left to the implementing party to decide the necessity behind the implementation of a legitimate policy objective and that the measures necessary for the protection of a Party's essential security interests shall not be disputed by any other party to the agreement.[1100]

Notably, EU-led agreements contain rather limited commitments on the issue of cross-border data flows. As Burri observes, the EU and its counterparts typically agree to consider in future negotiations commitments related to cross-border flows of data.[1101] In some cases, even in recent years, such a provision may be absent altogether.[1102] Yet, it is likely that, in all future trade agreements, the EU will start incorporating the draft set of horizontal provisions for cross-border data flows (and personal data protection) that it developed in the wake of the adoption of the GDPR to ensure that trade disciplines do not undermine the fundamental right to privacy.[1103]

Alongside disciplines on cross-border data flows, about seventeen PTAs contain a provision prohibiting or limiting data localisation requirements.[1104] According to Burri, the free trade agreement signed by Japan and Mongolia in 2015 is the first PTA to contain a binding rule on data localization requirements.[1105] The agreement bans each party from requiring a service supplier of the other party, an investor of the other party, or an investment of an investor of the other party in the Area of the former party to use or locate computing facilities in that Area as a condition for conducting its business.[1106] Subsequent agreements signed by countries in the Asia Pacific region largely replicated the text of their provisions on cross-border data flows when

[1099] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 156.
[1100] RCEP Article 12.15(3(a), footnote 14.
[1101] For example, Article 8.81 of the EU-Japan EPA states that "[t]he Parties shall reassess within three years of the date of entry into force of this Agreement the need for inclusion of provisions on the free flow of data into this Agreement". Burri, 'Data Flows and Global Trade Law' (n 428) 27.
[1102] See for example the EU-Mercosur Association Agreement that was finalised in 2019 but has yet to be ratified.
[1103] Sauvé and Soprana (n 1013) 296.
[1104] Luzern (n 1086).
[1105] Burri, 'Data Flows and Global Trade Law' (n 428) 28.
[1106] Japan-Mongolia EPA Article 9.10(1).

articulating their disciplines on data localisation requirements. More specifically, numerous PTAs ban requirements to use or locate computing facilities as a condition for conducting business, but allow the adoption or maintenance of inconsistent measures if they are necessary to achieve a legitimate policy objective, provided that they are not applied in manner which would constitute a disguised restriction to trade or a means of arbitrary or unjustifiable discrimination[1107], or do not impose restrictions on the use or location of computing facilities greater than are required to achieve the objective[1108], or are necessary for the protection of its essential security interests.[1109] Again, the reference to essential security interests, which in RCEP is compounded by the additional qualifier "such measures shall not be disputed by other Parties", seem to undermine the binding nature of this prohibition. At the opposite end of the spectrum, with the most stringent regime, lie USMCA and the Japan-US Digital Trade Agreement, which offer no exception to the prohibition of data localisation requirements.[1110] On the other hand, except for its agreement with the UK[1111], the European Union has so far refrained from including a provision on the location of computing facilities in its PTAs.

Over the years there has been an increase in the number of PTAs that include provisions on privacy, usually under the concept of 'data protection'.[1112] Reflecting the different positions of major actors and tensions between regulatory goals of data innovation and data protection, disciplines addressing this issue in PTAs tend to be a mixed bag of binding and non-binding provisions.[1113] Privacy and data protection appeared already in PTAs signed in the early 2000s although they consisted primarily of non-binding declarations, as exemplified by the Jordan-US FTA (Article II) and the Joint Statement of Global Electronic Commerce that is part of the FTA signed by

[1107] E.g. Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) 2018 Article 14.13.
[1108] E.g. DEPA Article 4.4.
[1109] Indonesia-Australia CEPA Article 13.12(3)(b); RCEP Article 12.14(3)(b).
[1110] Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 157.
[1111] See EU-UK TCA Article 201(1).
[1112] Burri, 'Data Flows and Global Trade Law' (n 428) 28.
[1113] ibid 28–29.

Canada and Costa Rica.[1114] According to Burri, three approaches to more binding data protection disciplines started to emerge over time.[1115] The first approach, which refers to the adoption of domestic standards, is exemplified by a number of PTAs signed since the mid-2010s that call for the parties to adopt or maintain a legal framework that ensures the protection of personal information of persons engaged in digital trade, with agreements like CPTPP, the DEA and USMCA citing principles and guidelines on data protection and cross-border data flows developed by APEC and OECD as reference[1116], and others - signed frequently by Latin American countries - referencing international standards for the development of online personal data protection standards.[1117] The second approach, which focuses on the criterion of 'equivalence', whereby countries allow the free moment of data if the receiving party protects data in a manner that is equivalent or similar to that applied by the party supplying the data, can be found in some EU-led PTAs.[1118] The third approach delegates a treaty body (e.g. Trade Committee in the EU-Colombia and Peru FTA) with proposing rules, guidelines and strategies for the protection of personal data.[1119]

Three further observations to be made on the treatment of personal data protection in PTAs, concerning primarily the difference in approach between the EU and the US, and the latest developments emerging from DEPA, the first standalone agreement dedicated entirely to trade in the digital economy. First, while several EU-led PTAs have special chapters on the protection of personal data[1120], USMCA is the first US-led PTA to include a provision (Article 19.8) that recognises key principles of data protection and the importance of ensuring that any restrictions on personal information are necessary and proportionate to the risks presented and of ensuring compliance

[1114] ibid 29.
[1115] ibid 30–33.
[1116] E.g. CPTPP Article 14.8; Australia-Singapore DEA Article 17; DEPA Article 4.2; RCEP Article 12.8; USMCA Article 19.8; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 158–159.
[1117] E.g. Trade Agreement between the European Union and its Member States, of the one part, and Colombia and Peru, of the other part, O.J. (L354), 2012 Article 162.2; Burri, 'Data Flows and Global Trade Law' (n 428) 31.
[1118] Burri, 'Data Flows and Global Trade Law' (n 428) 32.
[1119] E.g. EU-Colombia and Peru FTA Article 109(b); Burri, 'Data Flows and Global Trade Law' (n 428) 33.
[1120] E.g. EU-CARIFORUM EPA Chapter 6.

with measures to protect the person information.[1121] Secondly, non-US led agreements like RCEP, DEPA and the DEA between Australia and Singapore use more prescriptive language (e.g. "shall take into account the principles and guidelines of relevant international bodies") than the USCMA ("should take into account).[1122] Lastly, DEPA extends the scope of its disciplines on personal information protection to include the issue of 'data protection trustmarks', whose mutual recognition the Parties consider as a valid mechanism to facilitate cross-border data flows.[1123]

In addition to disciplines on cross-border data flows or transfer of information, prohibitions or limitations of data localisation requirements, and disciplines on personal data protection, several governments have started to include provisions related to open 'government data' in their PTAs. The DEA between Australia and Singapore defines this type of data as "non-proprietary information, including data, held by the central level of government".[1124] Recognizing that facilitating public access to and use of government information fosters economic and social development, competitiveness, and innovation, some agreements concluded since the mid-2010s establish that the parties shall endeavour to ensure that, when made publicly available, government information, including data, is in a machine readable and in open format, and to cooperate to identify ways in which each party can expand access to and use of open government data with a view to enhancing and generating business opportunities.[1125] Notably, the DEPA specifies that cooperation on open government data may include activities such as encouraging the development of new products and services based on open data set, and the identification of sectors where open data sets can be used to facilitate technology transfers, talent formation and innovation, among other

[1121] USMCA Article 19.8 of USMCA cites the following (non-exhaustive) list of principles: limitation on collection; choice; data quality; purpose specification; use limitation; security safeguards; transparency; individual participation; and accountability. Burri, 'Data Flows and Global Trade Law' (n 428) 32.
[1122] Regional Comprehensive Economic Partnership Agreement (RCEP) 2020 Article 12.8(2); DEPA Article 4.2(2); Australia-Singapore DEA Article 17(2); USMCA Article 19.8(2). See Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 159.
[1123] DEPA Article 4.2(8), (9) and (10); Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 159. ibid 159.
[1124] Australia-Singapore DEA Article 27(1).
[1125] E.g. EU-UK TCA Article 210; Australia-Singapore DEA Article 27; DEPA Article 9.5.

things.[1126] By unlocking to use of (anonymized) open government data, governments may actually impact the ability of services suppliers to use this type of data to train AI machines and export their services to foreign markets. This is especially significant in sectors where governments detain and manage large quantities of necessary data (e.g., healthcare).

6.4.2.2 Disciplines on source code

The treatment of source code does not concern artificial intelligence alone. Any kind of computer programme and software system is coded in source language, including AI algorithms.[1127] Yet, AI can be especially affected by the introduction of new disciplines on source code in PTAs because governments' efforts to increase algorithmic transparency and accountability through external auditing of AI systems (i.e. white box method)[1128] may involve the introduction of legislation requiring the forced disclosure or transfer or access to source code as a condition for market access[1129], a practice that can some WTO Members are attempting to limit in light of its potentially detrimental impact of digital trade.

Multiple countries have started to include specific disciplines on source code in their PTAs, with Japan and Australia being at the forefront. According to the TAPED database[1130] and the RTA repository of the WTO[1131], 11 PTAs – concluded between February 2015 and December 2020 - contain an article prohibiting the signatories from

[1126] DEPA Article 9.5(4).
[1127] Irion (n 34) 55, 57.
[1128] In computer science the term 'white-box testing' is used to describe the analysis of source code to discover errors. When it is not possible to access the internal structure or code of automated systems, auditors could apply the 'black-box testing' method (or input/output audit), which covers a range of techniques that can be used to better understand a system's inputs and outputs, and even approximate its underlying source code or models. Rieke, Bogen and Robinson (n 402) 17, 19.
[1129] Irion (n 34) 58.
[1130] Luzern (n 1086).
[1131] World Trade Organization, 'RTAs Currently in Force (by Year of Entry into Force (1948-2021)' (*Regional Trade Agreements Database*) <https://rtais.wto.org/UI/charts.aspx> accessed 23 March 2021.

imposing the forced transfer of, or access to, source code as a condition for granting market access.[1132]

Some scholars suggest that the introduction of this provision in PTAs stemmed from concerns than mandatory requirements for the transfer of knowledge could be used as potential barriers to trade and/or misappropriation of intellectual property and the desire to protect software companies against cracks in the security of their proprietary code.[1133] Japan itself has clarified that, since software programs are a source of competitiveness of companies in the modern economy, the risk of leakage of trade secrets arising from the forced disclosure of the source codes and algorithms at the time of importation of goods and services and the establishment of facilities constitutes a barrier to trade because it discourages - and even blocks - companies from exporting their products to the countries that impose such requirements.[1134] Therefore, in order to eliminate this potential barrier to trade, governments should prohibit the forced disclosure of source code and algorithms as a condition for the import, distribution, sale, or use of related products including digitally encoded products, with the exception of cases to achieve legitimate public policy objectives.[1135]

According to some experts, China, Colombia, India, Indonesia and Russia, are among the countries that introduced regulations requiring companies to disclose proprietary information to gain approval from regulatory agencies, especially in the public procurement sector.[1136] Indeed, the fact that RCEP, which China is a signatory to, does not include a provision on source code, appears to support the view that governments likely introduced these disciplines in their PTAs in response to China's introduction of regulatory requirements demanding access to source code from software producers

[1132] Japan-Mongolia EPA Article 9.11; PAFTA Article 13.16; CPTPP Article 14.7; EU-Mexico GA Article 9; EU-Japan EPA Article 8.73; USMCA Article 19.16; Indonesia-Australia CEPA Article 13.13; Japan-US DTA Article 17; Australia-Singapore DEA Article 28; Australia-Hong Kong FTA Article 11.12; EU-UK TCA 207.
[1133] Burri, 'Data Flows and Global Trade Law' (n 428) 36; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 163.
[1134] Japan, 'Joint Statement on Electronic Commerce Initiative - Proposal for the Exploratory Work by Japan (25 March 2019)' INF/ECOM/4 4.
[1135] ibid.
[1136] Lee-Makiyama (n 36) 7; Creemers, Triolo and Webster (n 312).

selling in its market.[1137] Likewise, no PTA signed by Russia or Turkey addresses the issue of source code. However, considering that the negotiations of the first agreement to include a provision on source code, the Japan-Mongolia FTA, started as early as 2010 and were concluded two years before China adopted its rather controversial 2017 Cybersecurity Law, concerns about the protection of source code and algorithms likely pre-date this specific Chinese regulation.[1138]

Provisions on the treatment of source code vary across PTAs. The Japan-Mongolia FTA set the framework for disciplining source code, which subsequent agreements built upon by either expanding the scope of application or adding qualifications and exceptions. In the agreement the Parties agreed not to require the transfer of, or access to, source code of software owned by a person of the other Party, as a condition of the import, distribution, sale or use of such software (or of products containing such software) in its territory.[1139] Also, acknowledging that there may be situations that would justify making market access conditional on the transfer of (or access to) source code, in addition to incorporating the GATS general and security exceptions in the EPA[1140], the Parties agreed to limit the application of Article 9.11 to mass-market software[1141] (or products containing such software) and excluded software used for critical infrastructure.[1142] The CPTPP and the FTAs concluded by Australia with Hong

[1137] Burri, 'Data Flows and Global Trade Law' (n 428) 36; 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 163.
[1138] For more details on the concerns raised by the US business community on source code requirements included in China's Cybersecurity Law of 2017 see Office of the United States Trade Representative, 'Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974' (2018).
[1139] Japan-Mongolia EPA Article 9.11(1).
[1140] ibid Article 1.10.
[1141] The Japan-Mongolia FTA does not define the term 'mass-market software'. According to the Oxford Advanced Learner's Dictionary, mass-market is used to indicate something that is 'produced for very large number of people'. Oxford Advanced Learner's Dictionary, 'Mass-Market' <https://www.oxfordlearnersdictionaries.com/definition/english/mass-market> accessed 2 November 2021. For the purposes of its Foreign Trade Regulations (FTR), the United States defines 'mass-market software' as software that is produced in large numbers and made available to the public. '15 CFR 30.1 -- Purpose and Definitions.' <https://www.ecfr.gov/current/title-15/subtitle-B/chapter-I/part-30/subpart-A/section-30.1> accessed 2 November 2021.
[1142] However, Japan and Mongolia refrained from further clarifying what the term 'critical infrastructure' refers to, thus leaving a potential margin for ambiguity in the interpretation of the scope of application of this provision. Article 9.11 (2) of the Japan-Mongolia EPA.

Kong, Indonesia and Peru contain a similar limitation.[1143] Some experts argue that the limitation to 'mass-market software' disqualifies most AI applications today in the business segment.[1144] This argument could find some support in the observation that AI is often used for customising services to the needs of the consumer, de facto disqualifying them from the 'mass-market software' concept.[1145] Consequently, following this line of reasoning, nothing would prevent the signatories of these agreements from imposing the disclosure of source code as a condition to supply (customized) AI-powered services in their markets. On the other hand, should AI applications be considered to fall under the definition of 'mass-market software', then they would be covered by the prohibition to condition market access on the forced disclosure of source code. Regarding the 'critical infrastructure' exclusion, some scholars have suggested that it would apply to a large section of the AI customer base, including transport, telecom and financial sectors, or public administration.[1146]

More recent agreements contain rather significant modifications to the scope of application of disciplines on source code. Case in point are some US-led PTAs where the Parties agreed to extend the coverage of their provision to include also 'algorithm expressed in that source code' and exclude limitations on mass-market software and critical infrastructure.[1147] According to Irion, since "an algorithm is commonly expressed in source code using a source language, whether this is hand-coded and text-based or visual and self-learning", the US approach "underscores an interpretation that the source code of software would already cover algorithms".[1148] References to the word 'algorithm' could be especially relevant for AI-based applications since this technology has also been described as algorithms trained on large quantities of data.[1149] Also, by extending the coverage of the disciplines on source code beyond mass-market software and to software used for critical infrastructure, these PTAs

[1143] CPTPP Article 14.17(2); Australia-Hong Kong FTA Article 11.12(2); Indonesia-Australia CEPA Article 13.13(2); PAFTA Article 13.16(2).
[1144] Lee-Makiyama (n 36) 11.
[1145] See Chapter 2.
[1146] Lee-Makiyama (n 36) 11.
[1147] USMCA Article 19.16; Japan-US DTA Article 17. See also Lee-Makiyama (n 36) 12.
[1148] Irion (n 34) 56.
[1149] Fink (n 75) 4.

minimise the risk that AI systems could be considered as falling outside the scope of application of the provision. The EU-led agreements, on the other hand, make no reference to market access being conditional on the requirement to transfer, or give assess to source code[1150] and, with the exception of the EU-UK TCA, do not prohibit *tout-court* the requirement to transfer or grant access to source code, since this obligation is couched in soft language ('may not') rather than in the hard language ('shall not') used instead in the other PTAs under consideration.[1151]

Other meaningful variations on the treatment of source code under PTAs concerns the enumeration of potential exceptions for the forced disclosure of source code. For example, in some PTAs the signatories indicated that there is no preclusion for commercially negotiated contracts requiring the transfer of (or access to) source code[1152], and that the Parties are not prevented from requiring the modification of source code of software necessary for that software to comply with laws or regulations which are not inconsistent with said agreements.[1153] However, in some cases they clarify that disclosures of source code requested by regulatory bodies or judicial authorities must not negatively affect the software source code's status as a trade secret, if such status is claimed by the trade secret owner.[1154] According to some experts this means that governments may scrutinise code to enforce their rules but cannot 'steal' it.[1155] In addition, several recent EU-led PTAs allow for the voluntary transfer of or granting of access to source code (e.g. in the context of government procurement).[1156] EU-led agreements tend also to include exceptions related to: (i) requirements by a court, administrative tribunal or competition authority to remedy a violation of competition law[1157]; (ii) the protection and enforcement of intellectual

[1150] EU-UK TCA Article 207(1); EU-Japan EPA Article 8.73(1); EU-Mexico GA Article 9(1).
[1151] EU-Japan EPA Article 8.73(1); EU-Mexico GA Article 9(1).
[1152] CPTPP Article 14.17(3); Indonesia-Australia CEPA Article 13.13(3); PAFTA Article 13.16(3); Australia-Hong Kong FTA Article 11.12(3); Australia-Singapore DEA Article 28(3); EU-Mexico GA Article 9(2); EU-UK TCA Article 207(2); Agreement between the European Union and Japan for an Economic Partnership (OJ L 330) Article 8.73(1).5/11/22 10:27:00 AM
[1153] CPTPP Article 14.17(3); Indonesia-Australia CEPA Article 13.13(3); PAFTA Article 13.16(3); Australia-Hong Kong FTA Article 11.12(3); Australia-Singapore DEA Article 28(3).11.05.22 10:27:00
[1154] USMCA Article 19.6(2); Australia-Singapore DEA Article 28.
[1155] Lee-Makiyama (n 36) 12.
[1156] EU-Japan EPA Article 8.73(1).
[1157] ibid Article 8.73(a); EU-UK TCA Article 207(3)(a); EU-Mexico GA Article 9(3)(a).

property rights[1158]; (iii) the right of a Party to take measures justifiable under the security and general exceptions of the Government Procurement Agreement[1159]; (iv) requirements by a regulatory body pursuant to a Party's laws or regulations related to the protection of public safety with regard to users online, subject to safeguards against unauthorised disclosure.[1160] Moreover, some agreements clarify that measures inconsistent with the prohibition to require the transfer of or the granting of access to source code can be justified under general and security exceptions and, for financial services, for prudential reasons.[1161] Notably, among the potential legitimate policy objectives that may warrant the adoption of said inconsistent measures, the EU-Mexico Global Agreement (GA) makes explicit reference to 'ensuring security and safety', which appear often amongst the AI ethical principles increasingly been adopted across different jurisdictions.[1162]

Interestingly, two agreements include a source code-specific security exception. The EU-Mexico GA establishes that each Party retains the right "to take any action or not disclose any information that it considers necessary for the protection of its essential security interests relating to the procurement of arms, ammunition or war materials, or to procurement indispensable for national security or for national defence purposes".[1163] The Australia-Indonesia CEPA states that nothing in the article on source code shall prevent a Party from adopting or maintaining any measures that it considers necessary for the protection of its essential security interests.[1164] Considering the numerous dual-use applications of AI, it is likely that any Party to each of these agreements could invoke the 'protection of its essential security interests' to justify requiring suppliers of AI-powered services from the other Party to disclose, transfer or grant access to their source code before being allowed to enter or operate in the

[1158] EU-Japan EPA Article 8.73(b); EU-UK TCA Article 207(3)(c); EU-Mexico GA Article 9(3)(b).
[1159] EU-Japan EPA Article 8.73(3)(c); EU-UK TCA Article 207(3)(d).
[1160] EU-UK TCA Article 207(3)(b).
[1161] EU-Japan EPA Article 8.73(3); EU-Mexico GA Article 9(2).
[1162] EU-Mexico GA Article 9(2).
[1163] ibid Article 9(3)(c).
[1164] Indonesia-Australia CEPA Article 13.13(5).

market. As a result, foreign AI-powered services and service suppliers may find it difficult to export in the market of the country invoking this exception.

However, there is a rather striking difference between these two PTAs. The EU-Mexico GA qualifies the 'essential security interests', which have to relate to either the procurement of arms, ammunition or war material or procurement indispensable for national security or for national defence purposes. Therefore, based on the standard of review emerging from recent WTO jurisprudence on the national security exception[1165], in case of dispute the Parties will have to demonstrate whether either of the two distinct situations enumerated in letter (c) of Article 9.3 of the agreement exist for the justification to be accepted. On the contrary, the agreement between Australia and Indonesia offers no definition or explanation of the term 'essential security interests', leaving ample margin of interpretation of this exception. Such a broad exception is likely to render the whole provision on the treatment of source code under the Australia-Indonesia CEPA rather toothless.

6.4.2.3 Other disciplines relevant to AI

Besides provisions related to data and source code, PTAs' chapters on electronic commerce or digital trade contain other disciplines that may be relevant to artificial intelligence. More specifically, disciplines on consumer protection, non-discrimination of digital products, cybersecurity, domestic regulation, and cooperation matter from an AI perspective to the extent that they contribute to mitigating risks associated with the use of this technology or promoting its innovation and development, or that they may impinge on governments' regulatory autonomy on AI.

In order to foster consumer trust in the digital world, an increasing number of PTAs include a specific article recognising the need to protect consumers from fraudulent, misleading and deceptive commercial activities, as well as unfair contract terms, and unconscionable conduct when they engage in electronic commerce or digital trade.[1166]

[1165] See Chapter 5.
[1166] See CPTPP Article 14.7; DEPA Article 6.3; RCEP Article 12.7; USMCA Article 19.7; EU-Japan EPA Article 8.78; Australia-Singapore DEA Article 15; Japan-US DTA Article 14; Monteiro and Teh (n 1013)

Some call on the parties to "adopt or maintain consumer protection laws to proscribe fraudulent and deceptive commercial activities that cause harm or potential harm to consumers engaged in online commercial activities".[1167] Examples of 'misleading and deceptive commercial activities' are misrepresentation of material fact that may cause significant detriment to the economic interests of a mislead consumer; making misrepresentations or false claims as to material qualities, price, suitability for purpose, quantity or origin of goods or services; advertising goods or services for supply without intention to supply; failing to deliver products or provide services to consumers after the consumers have been charged; or charging or debiting consumers' financial, telephone, internet or other accounts without authorisation.[1168] Bearing in mind that AI systems could be misused to perpetrate mischief[1169], the introduction of consumer protection disciplines in PTAs offers countries the opportunity to increase trust in AI applications by allowing the adoption of measures that, for example, would require service suppliers to inform consumers whenever they interacted with AI systems or, where appropriate, impose human oversight in automated decision-making to ensure opaque AI systems do not mislead or deceive consumers.

Disciplines on the non-discriminatory treatment of digital products included in several US-negotiated PTAs can also be relevant for artificial intelligence.[1170] CPTPP, the Japan-US DTA, and USMCA stipulate that a party "shall not accord less favorable treatment to a digital product created, produced, published, contracted for, commissioned, or first made available on commercial terms in the territory of another Party, or to a digital product of which the author, performer, producer, developer, or owner is a person of another Party, than it accords to other like digital product".[1171]

14, 43; Soprana, Marta, 'The Digital Economy Partnership Agreement (DEPA): Assessing the Significance of the New Trade Agreement on the Block' (n 1013) 158.Monteiro and Teh (n 1013) 14, 43.

[1167] See CPTPP Article 14.7(2); Australia-Singapore DEA Article 15(2); RCEP Article 12.7(2); Japan-US DTA Article 14(2).

[1168] See Australia-Singapore DEA Article 15(2); DEPA Article 6.3(3).

[1169] Russell and Norvig (n 90) 32.

[1170] There are several PTAs that include explicit commitments on non-discrimination. The majority lists market access and national treatment commitments separately. CPTPP, USMCA and the Japan-US DTA are among the few that address both in the same paragraph as part of a general commitment of a non-discriminatory treatment of digital products. Burri and Polanco (n 1013) 201.

[1171] See CPTPP Article 14.4(1); Japan-US DTA Article 8(1); USMCA Article 19.4(1).

All three agreements define digital products as "a computer programme, text, video, image, sound recording or other product that is digitally encoded, produced for commercial sale or distribution, and that can be transmitted electronically".[1172] Considering that the parties to CPTPP and USMCA clarified that the definition should not be understood to reflect a party's view that digital products are a good or are a service[1173], one could argue that AI-powered services could be considered as digital products and that, consequently, they fall under the scope of application of this provision. If this were the case, this discipline could be particularly relevant for the efforts made by governments to promote the development and use of AI through subsidies. Indeed, since subsidies or grants provided by a Party, including government-supported loans, guarantees or insurances, are excluded from the scope of application of the provision[1174], governments could remain free to provide discriminatory AI-specific subsidies to promote AI innovation and AI national champions in the services sector.[1175]

Cybersecurity-related disciplines, one of the new issues addressed by PTAs[1176], may also be relevant for AI. Governments have started to enact regulations to protect security in the digital sphere and counter criminal activities over the Internet, such as cyber-theft, cyber-attacks, and cyber-espionage.[1177] These measures may impact AI systems because, like several other digital technologies, they are susceptible to cybersecurity threats. Thus, to the extent that new disciplines on cybersecurity increasingly being introduced in PTAs set boundaries on what constitutes a permissible practice to protect digital products from cybersecurity risks, they may be relevant to AI and services powered by this technology.[1178] However, most cybersecurity provisions included in recent PTAs are non-binding and couched in soft language. In

[1172] CPTPP Article 14.1; Japan-US DTA Article 1; USMCA Article 19.1.
[1173] CPTPP Article 14.1; USMCA Article 19.1.
[1174] CPTPP Article 14.4(3); Japan-US DTA Article 8(2); USMCA Article 19.4(2).
[1175] Monteiro notes that several RTAs include a relatively similar provision specifying the scope of the e-commerce chapter and excluding subsidies from the whole e-commerce chapter and not only from the provision on non-discrimination. Monteiro and Teh (n 1013) 36.
[1176] ibid 69.
[1177] Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013) 5.
[1178] ibid.

several agreements the parties simply recognised that threats to cybersecurity undermine confidence in digital trade[1179] and that cybersecurity underpins the digital economy[1180], and stated the importance of cooperation, capacity-building of national entities dealing with matters of cybersecurity[1181], and workforce development in the area of cybersecurity, including possible initiatives relating to mutual recognition of qualifications, diversity and equality.[1182] In two of the most recent US-led agreements, the parties indicated that they consider prescriptive regulation less effective than risk-based approaches, thus setting a potential benchmark for cybersecurity regulation.[1183] However, since the parties simply agreed to endeavour to employ risk-based approaches to address cybersecurity threats, these provisions should be best considered as signalling tools of policy preference rather than constraints on a government's policy space. Should future trade agreements contain cybersecurity provisions mandating for the use of risk-based approaches rather than prescriptive regulation, then PTAs would *de facto* set boundaries to the type of AI-relevant cybersecurity measures that governments would be allowed to introduce.

Disciplines on domestic regulation may also matter from an AI perspective. While several PTAs make reference to the UNCITRAL Model Law on Electronic Commerce as the basis for domestic laws and regulations on electronic transactions, others simply require that domestic regulation affecting electronic commerce adhere to certain principles.[1184] For example, the parties to the EU-Japan, Japan-Mongolia, and Japan-Switzerland EPAs agreed to ensure that their measures of general application affecting electronic commerce are administered in a reasonable, objective and impartial manner[1185], mirroring the language of Article VI:1 of the GATS, and are not more

[1179] Japan-US DTA Article 19; USMCA Article 19.15.
[1180] Australia-Singapore DEA Article 34; DEPA Article 5.1.
[1181] CPTPP Article 14.16; Australia-Singapore DEA Article 34; DEPA Article 5.1; RCEP Article 12.13; Japan-US DTA Article 19(1); USMCA Article 19.15(1).
[1182] Australia-Singapore DEA Article 34; DEPA Article 5.1.
[1183] Japan-US DTA Article 19(2); USMCA Article 19.15(2).
[1184] Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013) 14–15.
[1185] EU-Japan EPA Article 8.74; Japan-Mongolia EPA Article 9.9; Agreement on Free Trade and Economic Partnership Between Japan and the Swiss Confederation, 19 February 2009, http://www.mofa.go.jp/region/europe/switzerland/epa0902/agreement.pdf Article 77.

burdensome than necessary to meet legitimate policy objectives.[1186] Therefore, any domestic regulation adopted by either party, including mandatory AI-specific technical standards and technical requirements (such as those contained in the Artificial Intelligence Act proposed by the EU Commission) would be subject to the conditions set out in these articles. Notably, although the three agreements share similar language[1187], the provision in the Japan-Mongolia EPA contains a strict 'necessity test' that is likely to place stronger limitations on the ability of governments to introduce domestic regulation that may affect trade in AI-powered services.

Lastly, consideration should be given also to provisions in PTAs that call for the parties to cooperate on a number of issues of relevance for artificial intelligence and services that are powered by this technology. They include personal information protection, particularly with a view to strengthening existing international mechanisms for cooperation in enforcing laws protecting privacy[1188], cybersecurity or security in electronic communications[1189], public morals, in particular ethics for young generations[1190], intellectual property[1191], financial technology[1192], online consumer protection[1193], and emerging technologies[1194].

All the above observations are based on the analysis of PTAs' chapters on electronic commerce or digital trade. This study acknowledges the possibility that other chapters in these agreements (e.g., chapters on subsidies, intellectual property, cooperation, services) may include provisions potentially relevant to AI. However, their assessment falls outside the scope of this research.

[1186] Japan-Mongolia EPA Article 9.9.
[1187] Notably, the article in the Japan—Switzerland EPA is couched in best endeavour language (i.e. 'shall endeavour to') rather than a harder obligation (i.e. 'shall ensure'). Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Modes and Lessons for the Multilateral Trade System' (n 1013) 15.
[1188] E.g. USMCA Article 19.4.
[1189] E.g. ibid; CPTPP 14.15; Japan-Switzerland EPA Article 82; Japan-Mongolia EPA Article 9.12.
[1190] E.g. Japan-Switzerland EPA Article 82; Japan-Mongolia EPA Article 9.12.
[1191] E.g. Japan-Switzerland EPA Article 82; Japan-Mongolia EPA Article 9.12.
[1192] E.g. DEPA Article 8.1.
[1193] E.g. Australia-Singapore DEA Article 33; CPTPP Article 14.15.
[1194] E.g. EU-UK TCA Article 211.

6.5 The WTO Joint Initiative on E-Commerce

The lack of progress under the Work Progress of Electronic Commerce, compounded by the stall in the Doha Round of multilateral trade negotiations, and concerns about the fragmentation in digital trade regulation resulting from the proliferation of PTAs containing new rules on electronic commerce and digital trade led a group of WTO Members to launch an initiative to negotiate rules on trade-related aspects of electronic commerce in the WTO forum, the first of this kind on this issue since the founding of the organisation. Although the scope, depth, and legal status of the outcome of these negotiations is still uncertain, it is likely that it will have an impact on the future of governmental action towards the establishment of AI governance frameworks.

6.5.1 Negotiating Rules on Digital Trade at the WTO

At the 11th Ministerial Conference (MC11) in Buenos Aires in 2017 over 70 WTO Members[1195] issued a joint statement signalling their intent to "initiate exploratory work towards future negotiations on trade-related aspects of electronic commerce" for the purpose of better harnessing the opportunities that electronic commerce creates for inclusive trade and development.[1196] Clarifying that their work builds on WTO rules and that the initiative is undertaken without prejudice to existing WTO agreements and mandates, the co-sponsors of the JI on e-commerce encouraged all WTO members to join in.[1197]

The absence of any explicit reference to the 1998 Work Programme on Electronic Commerce raised concerns among some non-participants to the JI, who questioned the need for and legal status of a separate initiative outside the aforementioned work programme.[1198] However, while the latter does not have a negotiating mandate, the JI on e-commerce was launched with the intent to negotiate new rules on digital trade, as evidenced by the claim made by several WTO Members that the main objective of

[1195] EU Member States are counted as individual WTO Members.
[1196] WTO, 'WTO Doc. WT/MIN(17)/60' (n 1027).
[1197] ibid.
[1198] Communication by India, Namibia and South Africa, 'The Legal Status of "Joint Statement Initiatives" and Their Negotiated Outcomes - Revision (30 April 2021)' WT/GC/W/819/Rev.1 8.

the Exploratory Work under the MC11 initiative is to "bridge knowledge gaps in order to prepare for the future WTO negotiations on trade related aspects of e-commerce".[1199] This was further confirmed in 25 January 2019 when 76 WTO members, including China, affirmed their intention to commence WTO negotiations on trade related aspects of electronic commerce, seeking to achieve "a high standard outcome that builds on existing WTO agreements and frameworks with the participation of as many WTO Members as possible".[1200]

Since its launch the initiative, which is open to all WTO Members, has experienced a surge in participation. As of July 2021, the total number of participating members has increased to 86.[1201] They are rather representative of the heterogeneous WTO membership, as they differ in income level, geographical origin, and digital readiness. Among them are developed countries (e.g., Australia, Canada, EU, US), developing countries (e.g., Argentina, Nigeria, Qatar, Russia, Thailand), as well as LDCs (e.g., Lao PDR), covering all continents. They include large and advanced digital economies (e.g., EU, US), smaller countries with a high degree of digital readiness (e.g., Chile, New Zealand, Singapore), and economies that have yet to develop a strong digital economy (e.g., Cambodia, Kazakhstan, Paraguay).[1202]

Most notably, among the members that participate in the JI on e-commerce are three of the major key players in the AI race, namely China, the EU, and the United States. On the other hand, India, who has vowed to become the AI garage for developing countries and LDCs (see Chapter 3), is one of the strongest opposers, together with South Africa. Both countries argue that all the plurilateral initiatives that were launched at the MC11[1203] create a new set of Agreements that are neither multilateral nor fall

[1199] WTO, 'Joint Statement on Electronic Commerce Initiative - Proposal for the Exploratory Work by Japan' (World Trade Organization 2018) JOB/GC/177 1.
[1200] WTO, 'WTO Doc. WT/L/1056' (n 1027).
[1201] World Trade Organization, 'Participants Cite Further Progress in E-Commerce Negotiations, Eye MC12 Guidance' (*World Trade Organization*, 22 July 2021) <https://www.wto.org/english/news_e/news21_e/jsec_22jul21_e.htm> accessed 22 September 2021.
[1202] Cisco, 'Cisco Global Digital Readiness Index 2019' (Cisco 2020) White Paper.
[1203] Four different initiatives were launched by different sub-groups of WTO Members at the 11th Ministerial Conference in Buenos Aires. They cover electronic commerce, services domestic regulation, investment facilitation, and micro-, small- and medium-sized enterprises (MSMEs).

under the Marrakesh Agreement definition of 'plurilateral agreement' and, if offered on an MFN basis and adopted without following the rules on consensus decision-making, would be legally inconsistent with the fundamental principles and procedures of the Marrakesh Agreement.[1204]

Indeed, the JI on e-commerce originated outside the traditional route of conducting trade negotiations in the WTO. Since the GATT period, multilateral rule-making is organized around the use of multi-issue, multi-year rounds of trade negotiations.[1205] Eight rounds were held between 1947 and 1994.[1206] The Doha Development Agenda (DDA) is the first, and so far only, Round launched after the founding of the WTO. The negotiations under the JI on e-commerce are conducted outside the Doha Round, which is widely considered dead in the water.[1207] As only about half of the membership is actively participating in the negotiations, despite the initiative being open to all WTO Members, the JI on e-commerce can be best described as a 'plurilateral' negotiating process whose expected outcome is currently uncertain both in terms of substance and legal standing within the WTO framework.[1208]

Conducted behind closed doors, this plurilateral initiative suffers from a general lack of transparency that, albeit not unusual for WTO trade negotiations, makes it more difficult to assess the extent to which the participants to the JI are discussing AI-related rules. While all documents and proposals pertaining to the JI on electronic commerce are accessible to the whole WTO membership, including non-participating Members, third parties (e.g. academia, civil society, other international organizations, non-governmental organizations and the private sector) are not privy to them, save

[1204] Communication by India, Namibia and South Africa (n 1198) 1–2.
[1205] Craig VanGrasstek, *The History and the Future of the World Trade Organization* (World Trade Organization 2013) 303.
[1206] Geneva (1947), Annecy (1949), Torquay (1950-51), Geneva (1956), Geneva (1960-61) - also known as the Dillon Round, the Kennedy Round (1964-67), the Tokyo Round (1973-79) and the Uruguay Round (1986-94). ibid 44.
[1207] Mihir S Sharma and Preety Bhogal, 'India and Global Trade Governance: Re-Defining Its "National" Interest' (2017) 1 Rising Powers Quarterly 125, 137.
[1208] Rudolf Adlung and Hamid Mamdouh, 'Plurilateral Trade Agreements: An Escape Route for the WTO?' (2018) 52 Journal of World Trade 85.

for a few sporadic proposals put forward by individual or groups of WTO members.[1209] However, among the documents restricted to the general public is a consolidated text that, circulated amongst the WTO membership in December 2020, was leaked to the public in February 2021.[1210] The latest version, dated September 2021, was leaked in October 2021.[1211] As the streamlined text is based on all text proposals submitted by members and on the incorporation of the outcomes of small group discussions that had been considered in plenary sessions, this working document allows to better understand the progress under the JI on e-commerce.[1212]

According to the September 2021 version of the draft consolidated text, the negotiations under the JI on e-commerce address six main topics: (i) enabling electronic commerce (Section A); (ii) openness and electronic commerce (Section B); (iii) trust and electronic commerce (Section C); (iv) cross-cutting issues (Section D); (v) telecommunications (Section E); and (vi) market access (Section F).[1213] The negotiations also include discussions on scope and general provisions (Annex 1), covering definitions, principles, scope, relation to other agreements, general exceptions, security exception, prudential measures, taxation, dispute settlement, and committee on trade related aspects of electronic commerce.[1214]

[1209] See, for example, Japan (n 1134); Communication from the European Union, 'Joint Statement on Electronic Commerce - EU Proposal for WTO Disciplines and Commitments Relating to Electronic Commerce: Revision of Disciplines Relating to Telecommunications Services (15 October 2019)' INF/ECOM/43.

[1210] The draft consolidated text is known as INF/ECOM/61/Rev.1. 'WTO Plurilateral Ecommerce Draft Consolidated Text' (*Bilaterals.org*, 2 October 2021) <https://www.bilaterals.org/?wto-plurilateral-ecommerce-draft> accessed 16 November 2021. It was leaked by Bilaterals.org, a collaborative platform initiated by a group of NGOs to support social movements resisting the imposition of bilateral trade and investment deals. 'About Bilaterals.Org' (*Bilaterals.org*, 2021) <https://www.bilaterals.org/?about-bilaterals-org> accessed 23 September 2021.

[1211] The revised draft consolidated text is known as INF/ECOM/62/Rev.2. 'WTO Plurilateral Ecommerce Draft Consolidated Revised Text' (*Bilaterals.org*, 13 October 2021) <https://www.bilaterals.org/?wto-plurilateral-ecommerce-draft-45155> accessed 16 November 2021.

[1212] Notably, several issues emerged during the negotiations, including the fact that several members have noted the need to determine the relationship of provisions with Members' market access commitments and the legal architecture of the JI outcome, and that some members want to carve out financial services, as defined in the GATS Annex on financial service, from the scope of the negotiations. 'WTO Plurilateral Ecommerce Draft Consolidated Text' (n 1210).

[1213] 'WTO Plurilateral Ecommerce Draft Consolidated Revised Text' (n 1211).

[1214] ibid.

Based on the publicly available documentation, it appears that several WTO Members drew heavily from their own experience in PTA rule-making on digital trade to recommend topics for consideration under the JI process and to put forward textual proposals. References to PTA practices can be traced back to early 2018, when the JI participants were debating about the scope of the exploratory work towards future negotiations. For example, in suggesting that the JI's participants ponder the inclusion of trade facilitation provisions (e.g. domestic electronic transactions framework, paperless trading, electronic authentication and recognition of e-signatures), a permanent moratorium on the imposition of customs duties on electronic transmissions, and consumer focused provisions (e.g. online consumer protection, protection of personal information of users of electronic commerce and measures to address unsolicited commercial electronic messages), New Zealand claimed its was drawing from its own FTA experience with both developed and developing Member partners.[1215] Singapore suggestion to discuss, among others, how to address infrastructure gaps to enable electronic commerce and improve online trust was based on elements found in existing RTAs, FTAs and previous WTO submissions.[1216] Likewise, the EU referred to Members' FTA practices as a source of inspiration for its proposal to cover electronic contracts, electronic authentication and trust services, consumer protection, unsolicited electronic messages, authorization requirements for on-line services and custom duties on electronic transmissions in the exploratory work towards WTO negotiations under the JI on e-commerce.[1217] Other countries, mainly developed economies, based their proposals on similar explanations.[1218] One Member specifically called for the WTO Secretariat to provide an analytical survey that would include an

[1215] WTO, 'Joint Statement on Electronic Commerce - Communication from New Zealand (11 April 2018)' JOB/GC/175 2–3.
[1216] WTO, 'Joint Statement on Electronic Commerce - Possible Elements for Exploratory Work on Electronic Commerce and Development - Communication from Singapore (13 April 2018)' JOB/GC/179 1–3.
[1217] WTO, 'WTO Doc. JOB/GC/188' (n 1070) 1.
[1218] WTO, 'Joint Statement on Electronic Commerce - Market Access and Electronic Commerce - Communication from Canada' (World Trade Organization 2018) JOB/GC/189 2; WTO, 'Joint Statement on Electronic Commerce - Communication from Australia' (World Trade Organization 2018) JOB/GC/199 1.

overview of the existing practices and mechanism of electronic commerce regulation in PTAs, and an illustrative list of the regulated electronic commerce issues.[1219]

The influence exerted by PTA practices in digital trade regulation is evident in some of the textual proposals included in the December 2020 consolidated text. For example, with regards to the proposed article on the location of computing facilities, several of its proponents have negotiated or concluded PTAs that contain a similar provision.[1220] Also, the language of the EU's textual proposal for paragraph 5 of the article on source code (Section C.3(1)) closely resembles that of Article 8.73 of its EPA with Japan, which was concluded in 2018.[1221] Likewise, the textual proposal advanced by Singapore about paragraph 4 of the article on paperless trading (Section A.2(1)) contains language bearing a striking similarity to that of Article 12(9) of the DEA it negotiated with Australia between 2019 and 2020.[1222]

6.5.2 Potential AI-related disciplines

Since the negotiators have heavily drawn on their PTA experience to negotiate new rules on electronic commerce in the WTO forum, one might expect to find disciplines that are explicitly directed at artificial intelligence akin to those found in the DEPA and

[1219] WTO, 'Joint Statement on Electronic Commerce Initiative - Communication from the Russian Federation (16 April 2018)' JOB/GC/181 1.

[1220] The US and Canada are parties to the USMCA, which has Article 19.12 prohibiting the domestic use or location of computing facilities as a condition for market access. The CPTPP, which Canada, Japan, and Singapore are parties to, contains a similar provision (Article 14.13).

[1221] The proposed text under the JI on electronic commerce reads: "*Paragraph 2 is without prejudice to: (a) requirements by a court, administrative tribunal, or by a competition authority to remedy a violation of competition law; (b) the protection and enforcement of intellectual property rights; and (c) the right to take any action or not disclose any information that is considered necessary for the protection of essential security interests relating to the procurement of arms, ammunition or war materials, or to procurement indispensable for national security or for national defence purposes*". Article 8.73(2) of the EU-Japan EPA reads: "*Nothing in this Article shall affect: (a) requirements by a court, administrative tribunal or competition authority to remedy a violation of competition law; (b) requirements by a court, administrative tribunal or administrative authority with respect to the protection and enforcement of intellectual property rights to the extent that source codes are protected by those rights; and (c) the right of a Party to take measures in accordance with Article III of the GPA*."

[1222] The proposed text under the JI on electronic commerce reads: "*The [Parties/Members] shall cooperate bilaterally and in international forums [, as well as provide technical assistance and exchange information,], to enhance acceptance of electronic versions of trade administration documents.]"*. Article 12(9) of the DEA reads: "*The Parties shall cooperate bilaterally and in international fora, where appropriate, to promote acceptance of electronic versions of trade administration documents and electronic records used in commercial trading activities between enterprises*".

the DEA between Australia and Singapore. However, it appears that this is not the case. The September 2021 version of the consolidate text does not contain any provision that is specifically dedicated to this technology. Nor is there any reference to ethical standards or the development of AI Governance Frameworks mentioned in Article 8.2 of the DEPA and Article 31 of the DEA. The term artificial intelligence appears only once, in a textual proposal by Brazil for the inclusion of an article on the use of technology for the release and clearance of goods (Section A.2(8)). Under risk management technologies paragraph 5 reads: "[Parties/members] shall endeavour to employ machine learning and other artificial intelligence technologies to improve the efficiency of their customs administration risk management systems".[1223] The term artificial intelligence is not defined. Thus, so far, the participants in the JI on e-commerce appear to have shown little inclination or concern to discuss the potential need for introducing AI-specific regulation in international trade agreements.

Yet, since the negotiations are ongoing and the consolidated text as already been revised twice since December 2020, it is still possible that AI-specific provisions could be included in the final text, for example through some form of incorporation of Module 8 of DEPA, as originally intended by Chile, New Zealand and Singapore.[1224] On the other hand, considering that only four countries[1225] have concluded agreements with a provision specifically dedicated to AI[1226], and with three others having expressed an interest in joining DEPA[1227], the road to reach convergence on this issue among the WTO membership may still be long and bumpy.

[1223] 'WTO Plurilateral Ecommerce Draft Consolidated Revised Text' (n 1211).
[1224] New Zealand Ministry of Foreign Affairs and Trade, 'Overview - The Digital Economy Partnership Agreement Is a New Initiative with Chile and Singapore' (*New Zealand Ministry of Foreign Affairs and Trade*) <https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/digital-economy-partnership-agreement-depa/overview/> accessed 4 November 2021.
[1225] Australia, Chile, New Zealand and Singapore.
[1226] DEA between Australia and Singapore, and DEPA.
[1227] Global Affairs Canada, 'Background: Canada's Possible Accession to the Digital Economy Partnership Agreement' (*Government of Canada*, 18 March 2021) <https://www.international.gc.ca/trade-commerce/consultations/depa-apen/background-information.aspx?lang=eng> accessed 7 April 2021; Damien O'Connor, 'New Zealand Welcomes the Republic of Korea's Formal Request to Join the Digital Economy Partnership Agreement (DEPA)' (*The Beehive*, 6 October 2021) <http://www.beehive.govt.nz/release/new-zealand-welcomes-republic-korea%E2%80%99s-formal-request-join-digital-economy-partnership> accessed 4 November 2021; Reuters (n 1085).

Nevertheless, there are several provisions proposed in the draft consolidated text of the agreement on electronic commerce that may be relevant for trade in AI-powered services. Unsurprisingly, they mostly cover topics already addressed in the analysis of PTAs, such as non-discriminatory treatment of digital products, cross-border transfer of information via electronic means/cross-border data flows, location of computing facilities, location of financial computing facilities for covered financial service suppliers, and open government data (Section B on openness and electronic commerce); consumer protection, privacy, and source code (Section C on trust and electronic commerce); and domestic regulation, cooperation and cybersecurity (Section D on cross-cutting issues). However, the draft consolidated text contains a rather unique additional provision, proposed by China, on the temporary entry and sojourn of electronic commerce-related personnel. The text of Section F.2(1) reads:

> *"Each [Party/Member] shall, in accordance with its domestic laws and regulations, encourage the movement of electronic commerce-related personnel, permit temporary entry into its territory of electronic commerce-related personal associated with a commercial presence of any other [Party/Member] that has been or is being established within the territory."*

While the provision does not define the term 'electronic commerce-related personnel', it offers a non-exhaustive list of categories that would fall under its coverage: business visitors, intra-corporate transferees, and contractual service suppliers. Should this proposal be included in the final outcome of the negotiations, it would mark the first time a WTO agreement refers to 'electronic commerce-related personnel' in lieu of 'natural persons'. It could also potentially fill a gap in the regulation of trade in AI-powered services in the (highly hypothetical) scenario that AI-systems take the form of human-like entities to supply a service in lieu of a natural person.[1228] Indeed, if such autonomous systems were to be considered as falling within the definition of 'electronic

[1228] See Chapter 5, Section 5.3.1.2.

commerce-related personnel', measures affecting their movement across borders would have to comply with this provision.

6.6 Concluding Remarks

The treatment of digital trade in international trade law has undergone a rather significant evolution since the foundation of the WTO, the organization at the helm of global trade rule-making. First, WTO Members recognized early on the significant impact that technological advances were likely to have on international trade, prompting them to establish a work programme specifically dedicated to exploring and discussing trade-related aspects of electronic commerce. Then, early attempts to negotiate digital trade liberalization in a multilateral setting did not come to fruition as the Doha Round negotiations stalled. The lack of progress in multilateral negotiations, compounded by a perceived sense of urgency to fill alleged gaps in regulation, led WTO members to increasingly rely on preferential trade agreements to advance and design new disciplines on digital trade. While PTAs proved to be a valuable avenue to quickly respond to the trade-related challenges brought on by technological progress, they also created regulatory fragmentation, and somewhat contributed to deepen the digital divide both across and within countries. Mindful of these issues and interested in reviving negotiations in a WTO setting, several Members launched a plurilateral process to negotiate the first WTO agreement to explicitly - and specifically - cover digital trade, although uncertainty surrounds the legal status of the final outcome of this initiative.[1229]

The scope and depth of disciplines on digital trade have also evolved with time, as has the coverage of artificial intelligence. While governments started including several AI-

[1229] The participants to the initiative may have three options: (i) create a multilateral agreement under Annex 1 of the Marrakesh Agreement Establishing the World Trade Organization (like the Trade Facilitation Agreement); (ii) create a 'Plurilateral Trade Agreement' under Annex 4 of the Marrakesh Agreement (like the Government Procurement Agreement); (iii) incorporate the new disciplines in the GATS schedules as additional commitments under Article XVIII of the agreement, following in the footsteps of the JI on services domestic regulation *(see* Joint Initiative on Services Domestic Regulation (n 695) Section I [7].*).* The first two options require consensus, which may be difficult to obtain given the fervent opposition some Members expressed towards the different plurilateral initiatives launched at the Eleventh Ministerial Conference. See Hamid Mamdouh, 'Legal Options for Integrating a New Investment Facilitation Agreement into the WTO Structure' (International Trade Center 2021).

related disciplines between the late 2000s and early 2010s, no explicit reference to AI could be found in PTAs until 2020, when DEPA and the DEA between Australia and Singapore were concluded. As of November 2021, these remain the only PTAs to include a specific article dedicated entirely to this technology and the establishment of AI governance frameworks, albeit others could follow suit. AI also made an appearance in the latest version of the draft consolidated text of the JI on e-commerce, but at this stage it is difficult to ascertain whether the article proposed by Brazil will be included in the final outcome of the negotiations in its current form or at all.

The timid emergence of AI-specific disciplines in international trade agreements warrants a few considerations. First, it signals that some governments acknowledge, to some extent, that artificial intelligence is like no other digital technology and that the unique challenges its increasingly widespread use pose require specific attention. Indeed, thus far no PTA chapter on electronic commerce or digital trade has included provisions explicitly and specifically dedicated to other digital technologies like blockchain, IoT, or 3D printing. It also flags a potential intent to use international trade agreements to govern AI and set certain boundaries on the ability of governments to regulate this technology.

On the other hand, considering that the number of agreements containing AI-specific disciplines is still microscopic in comparison to all the PTAs negotiated as of November 2021, one could argue that most governments may not deem it necessary to treat AI differently from other digital technologies, or may not consider PTAs as the most appropriate venue to address the legal challenges arising from the use of AI. Reluctance to include AI-specific disciplines in PTAs might be ascribed to three factors: (i) the complexity of the subject; (ii) uncertainty about the consequences of binding rules in trade agreements on innovation; and (iii) concerns about the ability of law to keep up with fast-paced advances in the field. Artificial intelligence is a sophisticated technology whose functioning suffers, among others, from lack of transparency and explainability, making it arduous for policymakers to understand whether and to what extent its use should be regulated. Trade negotiators might not be equipped with the necessary knowledge to understand how AI differs from other digital technologies, and

to assess whether its impact on international trade warrants a revision of existing rules or the negotiation of new ones. Also, governments may find it difficult to undertake binding obligations that, designed to address the need to mitigate the risks associated with the use of AI, might hinder its development and innovation. The fact that existing disciplines on artificial intelligence contained in the DEPA and the DEA between Australia and Singapore are non-binding, soft commitments seems to support this view. Lastly, the different paces at which technological progress advances and rule-making proceeds could have led governments to question the need to introduce technology-specific rules that may run the risk of becoming obsolete as AI innovation continues, and to lean towards the adoption of technology-neutral regulation.

PART IV - Conclusions

7 Chapter - Artificial Intelligence and Trade: Legal and Policy Implications

7.1 Artificial intelligence under International Trade Law: Lessons Learnt

Spurred by the increasing attention state and non-state actors are paying to artificial intelligence and its burgeoning application across all sectors of the economy, this study set out to investigate the extent to which international trade law matters for AI governance. More specifically, it aimed to determine what role international trade law can play in the establishment of norms and legal frameworks regulating the development and use of artificial intelligence.

Focusing on AI-powered services, this research addressed three key issues: (i) what artificial intelligence is and why it matters for international trade (Chapter 2); (ii) what efforts governments have put into place to govern this technology (Chapter 3 and 4); and (iii) what role GATS rules and emerging digital trade disciplines in PTAs play in regulating AI (Chapter 5 and 6).

As regards the first part of the study, four key observations emerge from the analysis of artificial intelligence, its history, key features, and applications. First, AI boasts certain characteristics that make it stand out among the other digital technologies that underpin trade in the XXI century. Of particular note is the relationship between machines and cognitive abilities, which affects not only services that are powered by AI technologies but also services suppliers. Secondly, AI was first conceptualised over forty years before the foundation of the WTO, and it has evolved over the decades, alternating between periods of boom and enthusiasm (AI springs) and periods of doom and gloom (AI winters). Now in a phase of growth, AI is expected to continue evolving in the future and become the dominant technology. Thirdly, data is only one of the key components of artificial intelligence, whose development and growth benefited greatly also from advances in computing power and algorithm-related innovations, such as the deep neural networks. Thus, any measure that applies or targets any of

core elements of AI (data, algorithms, and computing power) has the potential to impact the functioning of this technology and affect its application in various areas of the economy, including services. Lastly, artificial intelligence is relevant to several fields of research, both within and outside the realm of law. Because numerous services that are powered by it can be traded across borders, this technology matters for international trade law.

The second part of the study addressed AI governance efforts. It started, in Chapter 3, with an exploration of AI-related policies, i.e. measures that can be relevant to artificial intelligence without being specific to this technology and that, to some extent, existing literature has focused on when discussing the treatment of artificial intelligence in international trade law. From the analysis it emerged that examples of AI governance, primarily in the form of restrictions to the cross-border flow of data, existed well before the 2010s, when AI entered its current commercialisation phase and started to attract the attention of governments. Moreover, it emerged that policies affecting AI algorithms, such as the forced disclosure of or access to source code, as well as those impacting computing power, such as export controls on micro-processors, may also be relevant to trade in AI-powered services. Although data play a key role in the functioning of artificial intelligence and, unsurprisingly, most AI-related policies concern their treatment, discussing AI in international law only under the perspective of cross-border data flows may be reductive. As the field of computer science continues to evolve, new techniques, discoveries and radical breakthroughs could impact AI in the future. For example, developments in quantum computing, which are expected to have a huge impact on computers' processing power, could render digital technologies, including AI, less dependent on data than they currently are. Thus, understanding AI and its treatment under international trade law requires considering all measures that affect its functioning, moving beyond data whose prominent role in AI could start to wane in the long-term as the technology evolves.

The analysis of AI governance efforts proceeded in Chapter 4, with the exploration of AI-specific policies, their origins, nature, and relevance for international trade. It found that, recognizing the role that AI has come to play in today's digital economy, as well

as the opportunities and risks associated with its use, since the mid-2010s several governments have started to design and implement policies specifically dedicated to artificial intelligence. Four key characteristics of AI-specific policies are worth noticing. First, the development of AI ethical principles, AI technical, and AI-specific subsidies are the most likely to matter from an international trade law perspective. Secondly, most AI-specific policies are still in the early stages of development, with few examples of hard law, binding regulations being currently in force. However, there are signs that some governments are interested in adopting more stringent rules to regulate AI, as evidenced by the proposals advanced by the EU and Brazil.[1230] Thirdly, AI-specific policies are likely to address all three key components of AI, namely data, algorithms, and computing power. However, AI-specific policies are not the exclusive domain of governments. The study also found that multiple actors, including some outside the realm of international trade, are involved in the establishment of AI governance frameworks, as evidenced by the emergence of AI ethical principles adopted by private companies and other non-state actors.

The third part of the study investigated the role that international trade agreements play in AI governance. Focusing its analysis of the GATS, Chapter 5 explored the extent to which international trade law can place limits on the ability of states to regulate artificial intelligence and the impact this technology can have on trade rules negotiated when AI was yet to become a viable technology for commercial purposes. It found that the, to the extent that AI-specific policies fall under the GATS definition of 'measures affecting trade in services', they are covered by the Agreement and are, therefore, expected to be consistent with its obligations and commitments. However, the scope and strength of the boundaries set by the GATS on recent AI governance efforts can be influenced by a several factors, including the type of AI-specific policy adopted, the entity implementing the policy, and the rationale behind its design and application. Uncertainty surrounding the classification of AI-powered services, and the potential impact of AI on modes of supply, technological neutrality, and the concept of likeness may also make it difficult to ascertain whether a WTO Member's AI-specific

[1230] EU Artificial Intelligence Act; Heikkilä (n 618).

policies are in compliance with a its obligations and specific commitments under the GATS.

In addition to the analysis of existing multilateral rules on trade in services, this research set out to investigate what role PTAs and the ongoing WTO plurilateral negotiations on electronic commerce can play in AI governance. From Chapter 6 it emerges that there are two types of emerging digital trade rules that could cover artificial intelligence and contribute to setting boundaries on the ability of governments to regulate this technology: AI-specific rules, and AI-relevant rules. The former, which have slowly started to appear in a limited number of PTAs concluded by countries in the Asia-Pacific region since 2020, focus specifically on AI, acknowledging its role in the digital economy and the emergence of AI governance frameworks. The latter, which do not target AI specifically or exclusively but are relevant to all digital technologies underpinning the Fourth Industrial Revolution, including AI, comprise disciplines on cross-border data flows, source code, consumer protection, non-discrimination of digital products, cybersecurity, domestic regulation, and cooperation. Three key observations can be drawn from the analysis. First, the coverage of digital trade and AI in PTAs has evolved over time, with AI-relevant rules first appearing in the early 2000s and AI-specific rules only two decades later. Secondly, since there is still a high degree of fragmentation in digital trade regulation in PTAs, echoing the different approaches governments have on the subject, a multilateral agreement on digital trade with meaningful AI-relevant provisions is unlikely to materialize in the near-future. Lastly, while there is a possibility that, in the long term, more governments may follow in the footsteps of Chile, New Zealand, and Singapore and their DEPA negotiations, the complexity of AI, the uncertainty surrounding the effect of binding rules on AI innovation, and concerns about the difference in pace between rule-making and technological progress may influence their decision to include AI-specific provisions in international trade agreements.

7.2 Reconciling AI governance with International Trade Law: Looking Ahead

This research, which focused on the analysis of one specific area of WTO law (services), shows that, to a certain extent, international trade law can contribute to limiting the WTO Members' ability to regulate AI and may offer a route for the establishment of AI governance frameworks. Yet, the nature, key features, and historical development of this technology instil some degree of uncertainty on the interpretation of several GATS rules, thus putting into question the ability of existing multilateral trade rules to address some of the legal and policy challenges that may arise from the increasingly widespread application of AI for commercial purposes.

In order to clarify some of the issues surrounding the application of WTO agreements to AI-specific (and AI-related) policies and fill in the potential gaps in interpretation of existing rules, WTO Members may recur to two options. On the one hand, governments could take a pro-active role by amending existing rules or negotiating new ones, either through multilateral negotiations or plurilateral negotiations, such as the JI on e-commerce. For example, governments may consider revising the GATS services classification lists (and, possibly, review their specific commitments) to better reflect the realities of the AI era and clarify the coverage of AI-powered services under the Agreement. This is a route that WTO Members have already followed before, when they introduced alternative or supplementary classifications in a few sectors (e.g., financial, maritime, and telecommunication services,) even after the conclusion of the Uruguay Round, which could thus serve as guidance moving forward.[1231] On the other hand, WTO Members could delegate the resolution of this matter to Panels and the AB, through the dispute settlement mechanism. Each approach has some advantages and disadvantages. Their examination offers the opportunity to make a few general remarks about the relationship between international trade law and AI governance moving forward.

[1231] However, it is rather unlikely that the whole WTO membership would agree on a revision of document W/120 or the CPC classification, due to concerns that doing so would force the undertaking of new commitments that some WTO Members might not be able to afford. Zhang (n 63) 7.

Designing new rules or amending existing ones through a negotiating process can be advantageous for several reasons. First, it affords WTO Members the chance to establish rules that can be better suited to the realities of artificial intelligence and its applications in the digital economy. Through negotiations governments can explicitly indicate what aspects of AI should be addressed in international trade agreements and clarify the limits to the ability of governments to impose trade-restrictive measures aimed at supporting AI innovation and minimising the risks associated with the use of this technology. Thus, negotiations allow governments to take the lead in clarifying areas where there is confusion over the applicability of trade rules. Secondly, there is political significance attached to negotiations. Governments can use the latter to disclose their policy interests, make political statements, and contribute to introduce global norms on trade and artificial intelligence that would reflect their domestic interests. Moreover, on some issues governments could exploit existing negotiating mandates or venues to advance their 'AI-mindful' trade agenda. Cases in point are Article XV and Article VI:4 of the GATS: fulfilling their negotiating mandates could allow WTO Members to reduce uncertainty about the applicability of GATS rules on subsidies and domestic regulation on measures affecting trade in AI-powered services. At the same time, governments could take advantage of the WTO negotiations under the JI on electronic commerce, and their PTAs best practices, to design AI-relevant rules that could apply either to a subset of WTO Members or on an MFN basis, depending on how the negotiators intend to incorporate the final outcome in the legal architecture of the WTO.

However, the rule-making approach has some disadvantages and drawbacks that would make it harder for WTO members to design new rules or amend existing ones through negotiations. First, there is a somewhat inherent mismatch between the pace of negotiations and the speed at which technological progress advances. The WTO history shows that the more complex and the broader the range of issues at stake, the more time-consuming trade negotiations can be.[1232] However, digital innovation and technological progress, including in the AI field, advances at a faster pace.

[1232] VanGrasstek (n 1205).

Consequently, there is a potential risk that, under certain circumstances, at the time negotiations conclude the finalised outcome (i.e., new/amended rules and/or commitments) may already result somewhat obsolete with respect to the technology it attempts to regulate. Indeed, compounded by the (rather optimistic) view that, as technological progress advances, AGI might be in sight within a few decades, AI history suggests that today's AI systems may show little resemblance to future AI machines and applications. Consequently, rules specific for today's AI technology may not necessarily work for tomorrow's AI. If governments were to fill in the gaps in existing international trade law on the treatment of AI-powered services by introducing, for example, a narrow definition of artificial intelligence or rules that are excessively tailored to today's AI, their efforts to adapt international trade law to the AI era may result in rules at risk of obsolescence in the not-so-distant future. On the other hand, although potentially more sustainable in the long term, less specific rules (e.g., an excessively general definition of AI or quite comprehensive rules) run the risk of being unable to address issues arising from the use of existing AI technologies. Thus, governments would need to find the right balance between the creation of rules that cater to the needs of existing AI systems and the need to minimise the risk of regulatory obsolescence, should technological advances dramatically change AI in the medium-long term.

The second problem with the rule-making approach concerns the AI race. Artificial intelligence is a politically contested issue, with numerous countries striving to lead in AI development and to exploit first-mover advantages. Interested in advancing their AI agenda and policy objectives, countries at the opposite sides of the AI race may struggle to find a middle ground, compromising the chances of ever concluding meaningful negotiations on new disciplines or amendments to existing GATS rules. Moreover, as different countries attempt to increase their AI capabilities, with potential consequences on the current balance of power in international trade relations,[1233] it is possible that the AI race could affect the bargaining power of the countries involved

[1233] Lee (n 106).

in the negotiations. This could leave countries with limited AI capabilities at the periphery of rule-making, leading to a potential increase in the digital divide.

An additional issue concerns the knowledge required to negotiate trade rules for the AI era. Clarifying the applicability of existing GATS rules to trade in AI-powered services would require Members to have a thorough knowledge of artificial intelligence, a complex technology whose development involves different fields of study, such as computer science, psychology, neuroscience, and linguistics.[1234] Thus, without a reconsideration of the format in which WTO negotiations take place, allowing greater participation and input from AI experts and the other actors involved in the development and regulation of AI, WTO Members may struggle to fill the gaps in the interpretation of existing GATS rules in the AI era through rule-making.

Consideration should be given also to the issue of 'consensus', which affects any negotiation currently taking place a WTO, not only those specific to artificial intelligence. Partly due to the increase in membership[1235] and a significant shift in power since the foundation of the WTO[1236], WTO Members are facing difficulties in reaching consensus, an essential requirement for negotiations of multilateral and plurilateral agreements.[1237] As evidenced by the failure of the DDA, when lots of different interests were at stake, the multilateral negotiating route may not be a viable option. On the other hand, the opposition to the plurilateral initiatives launched in 2017 at the 11th Ministerial Conference from certain quarters of the WTO Membership suggests that plurilateral negotiations may also be somewhat impractical. This leaves little room for WTO Members to reach any meaningful outcome in rule-making at the WTO. Without the political will to overcome these difficulties, PTAs could remain the

[1234] Russell and Norvig (n 90).
[1235] WTO members have increased from 76 on 1 January 1995 to 164 on 31 December 2021. See 'WTO Members and Observers' (*World Trade Organization*) <https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm> accessed 4 January 2022.
[1236] The Uruguay Round negotiations were led primarily by developed countries. Over the decades some developing countries like China, India, and South Africa have acquired significant bargaining power, exercising larger influence on the outcome of the negotiations.
[1237] Article X of the Marrakesh Agreement establishes that any amendment to the multilateral trade agreements in Annex 1 and any negotiation of new plurilateral trade agreements in Annex 4 requires consensus.

only option available for governments to establish disciplines aimed at reconciling AI governance with international trade law.

In assessing the viability of the rule-making approach a few additional issues should be kept in mind. First, concerns may arise as to whether the WTO and international trade agreements are appropriate venues for negotiating binding rules on AI.[1238] Since artificial intelligence is a complex subject matter that does not pertain exclusively to the realm of trade, there is a risk that introducing disciplines on AI in international trade agreements may unwittingly and unnecessarily constrain the ability of governments to regulate artificial intelligence in other areas of law. As a potential solution, WTO Members could undertake a different approach to negotiations involving greater participation by AI experts, to help trade negotiators navigate the complexities of this technology, as well as other (non-state) actors that are currently involved in the development of AI governance frameworks. For instance, following the example of the European Commission, who relied on the policy recommendations of the independent High-Level Group on Artificial Intelligence to design the proposed regulation on AI, expert studies on AI undertaken by third parties could be used as a basis for negotiations, especially to clarify issues related to the classification of AI-powered services. Moreover, given the sensitivity of the subject matter and the non-trade implications stemming from the use of artificial intelligence (e.g., job displacement, discrimination, social control, authoritarian abuses), governments may consider the need to make negotiations more transparent. The WTO Secretariat could hold public consultations that would enable trade negotiators in capitals, and delegations in Geneva, to have a better understanding of the issues that surround the use of AI and design rules that can work for both services suppliers and consumers in a manner that does not unduly affect trade in AI-powered services.

Secondly, WTO Members may need to consider the pros and cons of multilateral or plurilateral negotiations (i.e., JI on e-commerce). Both options would allow to reduce the fragmentation in AI-relevant disciplines that it is arising from PTAs and afford WTO

[1238] Peng, Lin, Ching-Fu and Streinz (n 29) 18.

Members the opportunity to advance the trade agenda.[1239] Multilateral negotiations, in particular, would ensure that all WTO members share in principle the same set of benefits and obligations, thus levelling the playing field. However, due to the previously mentioned consensus issue, at this point in time in the history of the organisation the multilateral route appears little viable. The plurilateral route is also problematic. On the one hand, the opposition towards the use of plurilateral negotiations by some prominent countries (i.e., India and South Africa), who have remarkable influence among developing economies, risks increasing the digital divide between WTO Members who would participate in the negotiations (rule-makers) and those that would not (rule-takers). On the other hand, if the outcome of plurilateral negotiations is applied on an MFN basis, there is an increased risk of free-riding, as non-participants could still benefit from the negotiations without the need to undertake the same obligations and commitments that would bind the participants.

Lastly, with regards to how WTO Members may come to a common understanding on how to adapt international trade law to the AI era, questions may arise as to whether interoperability (or the management of regulatory diversity[1240]) is preferable to harmonisation. The former, which allows WTO Members to accommodate potentially different approaches to AI standards and regulation, could make it easier for governments to find common ground and reach an agreement.[1241] Harmonisation, on the other hand, would reduce regulatory fragmentation and level the playing field, for example by preventing governments from using different AI national standards as competitiveness tools. However, striving for harmonisation would make it more difficult for WTO Members to reach convergence on binding rules, and may increase the risk that negotiations result in watered down or best endeavour disciplines that would serve little to no purpose.

[1239] Bypassing the stall in the DDA negotiations to advance the negotiating agenda likely influenced the decision by a group of WTO Members launched plurilateral initiatives at the 11th Ministerial Conference in Buenos Aires, in 2017, on services domestic regulation, electronic commerce and investment facilitation for development.
[1240] Krajewski (n 51) 412.
[1241] Honey (n 1013) 234.

Considering how challenging it could be for WTO Members to advance negotiations at the WTO, governments may opt to rely on rules-adjudication to clarify some of the issues surrounding the application of WTO agreements to AI-specific (and AI-related) policies and fill in the potential gaps in interpretation of existing rules. This would enable governments to avoid potentially time-consuming and unproductive negotiations. Moreover, since Panels and the AB have shown some propensity to consider international trade law a living creature, WTO adjudication may help circumvent the issue of regulatory obsolescence.

However, there are four major issues associated with this approach. First, it could be extremely challenging and time-consuming for WTO adjudicators to navigate through the technical knowledge necessary to preside over disputes involving such a complex subject matter as AI. This could be especially problematic for AB proceedings, as the more technically complex the case, the more difficult it could be for AB Members to meet their deadlines.[1242] Also, some WTO Members may accuse WTO adjudicators of 'judicial overreach' and contest their decisions, as evidenced by the accusations levied by the US against the AB, which led to the suspension of appointment of AB Members and contributed to the current crisis of the organisation.[1243] The latter constitutes an additional problem for relying on interpretation to provide clarity on the treatment of AI under international trade law. Indeed, in the absence of a functioning AB, countries that do not participate in the Multi-party Interim Appeal Arbitration Arrangement (MPIA)[1244] may appeal Panel reports that they find unfavourable to them, thus leaving their findings (including potential clarifications on the coverage of AI-powered services under the GATS) in suspension. Moreover, the creation of MPIA could lead to 'interpretative fragmentation'. As Jaswant points out, "MPIA will now create a separate

[1242] Pursuant to Article 17(5) of the Dispute Settlement Understanding (DSU), AB proceedings must not exceed 90 days.
[1243] United States Trade Representative, 'Report on the Appellate Body of the World Trade Organisation' (2020).
[1244] European Commission, 'World Trade Organization Contingency Appeal Arrangement' (*European Commission*, 27 March 2020) <https://ec.europa.eu/commission/presscorner/detail/en/IP_20_538> accessed 5 January 2022; WTO, 'Statement on a Mechanism for Developing, Documenting and Sharing Practices and Procedures in the Conduct of WTO Disputes - Addendum (30 April 2020)' JOB/DSB/1/Add.12.

category of appellate reports since the arbitration awards are not required to be adopted by the DSB".[1245] Since not all WTO Members participate in MPIA, it is possible that Panels will not necessarily rely on MPIA's arbitration awards to guide their interpretation of WTO rules, especially for disputes involving non-participants to MPIA, resulting in the fragmentation of WTO law.[1246] Therefore, one cannot exclude that disputes involving similar issues (e.g., classification of AI-powered services) could be interpreted rather differently by Panels (or the AB, if and when it resumes functioning) and the MPIA. This could diminish the ability of the dispute settlement system to provide clarity on the application of the GATS (and other WTO Agreements) to AI.

7.3 Concluding Remarks

Inserting itself in the macro-debate on digital trade regulation and the treatment of emerging technologies under WTO law, this study contributes to fill a gap in the literature by exploring the relationship between artificial intelligence and international trade law, with a focus on trade in services. This study found that, to the extent that AI impacts how services are produced and supplied across borders for commercial purposes, international trade law can contribute to shaping AI governance by setting some boundaries on the ability of governments to regulate this technology and promote its innovation. However, it also found that AI's disruptive nature, the potentially significant impact of its future developments on services and services suppliers, may also influence international trade law moving forward. It forces governments to reconsider the extent to which existing rules can keep up with technological progress in this field, to evaluate whether new disciplines that take into account the peculiar nature of AI are necessary, and to rethink the role of the WTO in the AI era.

[1245] Shilpa Singh Jaswant, 'Arbitration in the WTO: Changing Regimes Under the New Multi-Party Interim Appeal Arbitration Arrangement' (*Kluwer Arbitration Blog*, 14 May 2020) <http://arbitrationblog.kluwerarbitration.com/2020/05/14/arbitration-in-the-wto-changing-regimes-under-the-new-multi-party-interim-appeal-arbitration-arrangement/> accessed 5 January 2022.
[1246] Kholofelo Kugler, 'Operationalizing MPIA Appeal Arbitrations:: Opportunities and Challenges' in Manfred Elsig, Peter van den Bossche and Rodrigo Polanco (eds), *International Economic Dispute Settlement: Demise or Transformation?* (Cambridge University Press 2021) 87–88.

As pressure to regulate Al mounts and expectations of an increase in the adoption of Al-specific measures grow, reducing any existing uncertainty surrounding the treatment of Al under international trade law becomes critical to ensure producers and consumers can benefit from both trade liberalization and Al innovation, whilst being afforded legitimate protection from any risks associated with the use of this technology. This study may contribute to do so, by presenting an analytical framework that could be used to guide future investigations on the treatment of Al under other WTO Agreements (e. g. GATT, TRIPS), and by providing an extensive examination of the relationship between AI governance and international trade law in the services field, which future researchers could use to identify issues that may require further exploration.

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