Executive summary

The widespread and transformative impact that artificial intelligence (AI) is currently having on society is being felt in all areas, from work, production and trade to health, arts and leisure activities. New applications of AI are expected to create unprecedented new economic and societal opportunities and benefits. However, significant ethical and societal risks are also associated with the development and application of AI. These risks have implications for all these areas too, including trade. AI is a global issue, and as governments increasingly move to regulate AI, global cooperation is more important than ever.

Against this backdrop, the present report examines the intersection of AI and international trade. It begins with a discussion of why AI is a trade issue, before delving into the ways in which AI may shape the future of international trade. It discusses key trade-related policy considerations raised by this technology and provides an overview of government initiatives taken both to promote and to regulate AI. The report also highlights the looming risk of regulatory fragmentation and its impact, in particular on trade opportunities for micro, small and medium-sized businesses. Finally, the report discusses the critical role of the WTO in facilitating AI-related trade, ensuring trustworthy AI and addressing emerging trade tensions.

Why is AI a trade issue?

AI is distinct from other digital technologies in several key ways, and it has the potential to affect international trade significantly. It is a general-purpose technology, capable of adapting to a wide range of domains and tasks with unprecedented flexibility and efficiency. It relies on large datasets to learn and improve its performance and accuracy. AI's functions and efficiency can evolve rapidly, leading to dynamic shifts in its capabilities and autonomy. Finally, its inherent complexity and opacity, as well as its potential failures and biases, raise significant concerns related to matters such as how to understand the reasons for and basis of AI decisions and recommendations, or regarding ethics and broader societal implications.

AI can be leveraged to overcome trade costs associated with trade logistics, supply chain management and regulatory compliance. By enhancing trade logistics, overcoming language barriers, and minimizing search and match costs, AI can make trade more efficient. It can help to automate and streamline customs clearance processes and border controls, navigate complex trade regulations and compliance requirements, and predict risks. AI-based tools can be used in trade finance, and can significantly enhance supply chain visibility by providing real-time data analytics, predictive insights and automated decision-making processes. All of this could lower trade costs and, as a result, level the playing field for developing economies and small businesses, helping them to overcome trade barriers, enter global markets and participate in international trade.

AI can transform patterns of trade in services, particularly digitally delivered services. It can enhance productivity, especially in services sectors that rely on manual processes, by enabling low-skilled workers to leverage best practices of more high-skilled workers more effectively. For example, generative AI can amplify the performance of business consultants by up to 40 per cent compared to those not using it. Greater productivity gain is also observed for lower-skilled workers (Dell'Acqua et al., 2023). Research also shows that access to generative AI increases the productivity of call centre workers by an average of 14 per cent, and by 34 per cent specifically for novice and low-skilled workers (Brynjolfsson et al., 2023). AI can also foster the development of innovative services and increase demand for them. However, while AI can enhance trade in digitally delivered services significantly, it has contributed to reducing the demand for certain traditional services. AI-enabled automation can also reduce the necessity to outsource certain services.

AI can increase demand and trade in technology-related products. Because AI systems often rely on real-time data streams and seamless connectivity, the adoption of AI is spurring demand for complementary goods related to information and communications technology (ICT) infrastructure and information technology (IT) equipment. These include computer and telecommunications services, specialized development tools and software libraries. For example, the global market for AI chips was valued at US$ 61.5 billion in 2023 and it has been projected that it could reach US$ 621 billion by 2032 (S&S Insider, 2024). As many of these goods and services are often supplied by a small number of economies, international trade serves as a major channel to foster AI development worldwide. Further upstream in the value chain, trade in the extraction and processing of critical metals and minerals, as well as trade in energy, are also likely to gain in importance. In addition, AI has substantially heightened the demand for data, fundamentally reshaping the landscape of data usage and trade.

By affecting productivity, and through shifts in production dynamics, AI may reshape economies' comparative advantages. AI is expected to enhance productivity across all economic sectors in both developed and developing economies, and to change the composition of inputs required for production, placing greater emphasis on capital investment, rather than on labour inputs. This shift in production dynamics could reshape trade patterns. Conversely, new sources of comparative advantage may emerge from factors like educated labour, digital connectivity and favourable regulations. Because AI is energy-intensive, economies with abundant renewable energy may also

gain comparative advantages. However, although AI can potentially benefit all economies, the development and control of AI technology are likely to remain concentrated in large economies and companies with advanced AI capabilities, resulting in industrial concentration.

The adoption of AI can drive productivity increases across various sectors and reduce trade costs, leading to global gains in trade and GDP. Simulations using the WTO Global Trade Model show that, under an optimistic scenario of universal AI adoption and high productivity growth up until 2040, global real trade growth could increase by almost 14 percentage points. In contrast, a cautious scenario, with uneven AI adoption and low productivity growth, projects trade growth of just under 7 percentage points. The simulation further shows that, while high-income economies are expected to see the largest productivity gains, lower-income economies have better potential to reduce trade costs.

The global trade and GDP impact of AI varies significantly across economies and sectors, depending on choices made concerning innovation and policies. While trade growth in high-income economies remains relatively stable across projected scenarios, low-income economies could experience much higher trade growth under the scenarios of universal AI adoption and high productivity growth (18.1 percentage points) compared to those of uneven AI adoption and low productivity growth (6.5 percentage points). The simulation results suggest that if developing economies improve their AI readiness by strengthening digital infrastructure, enhancing skills and boosting innovation and regulatory capacity, they will be in a better position to adopt AI effectively.

These simulations show that digitally delivered services[1] are expected to experience the highest trade growth. In an optimistic scenario of universal AI adoption, digitally delivered services are projected to see cumulative growth of nearly 18 percentage points relative to the baseline scenario, the largest increase across all sectors. The expected impact of AI on real trade growth also differs within sectors. Potentially digitally delivered services such as education, human healthcare, and recreational and financial services, as well as manufacturing sectors such as processed food, are projected to experience significant trade growth, largely driven by trade cost reductions. Meanwhile, sectors related to natural resource extraction and manufacturing sectors such as textiles are expected to see limited growth.

The policies of AI and trade

The discussion on how AI might reshape international trade raises important policy questions. The risk of a growing divide resulting from applications of AI is significant,

as are data governance challenges and the need to ensure that AI is trustworthy and to clarify how it relates to intellectual property (IP) rights. The implementation of AI at the domestic, regional and international levels entails both benefits and risks, and a lack of coordination could cause increasing regulatory fragmentation with regard to AI.

Addressing the risk of a growing AI divide is essential to leverage the opportunities offered by this technology. Currently, the capacity to develop AI technology is concentrated in a few large economies, and this is creating a significant divide between economies that are leading research and development (R&D) in AI – in particular China and the United States – and the rest of the world. This imbalance could be further exacerbated by the use of government subsidies to develop AI. The risk of industry concentration within a few large firms could also intensify the divide between firms. These features, combined with the opacity of AI algorithms and the possibility of tacit collusion among competitor firms to maintain higher prices, present challenges for competition authorities.

The rise of AI is raising important data governance issues that will need to be addressed to prevent further digital trade barriers. Cross-border data flows are essential to AI, as vast amounts of data are needed to train AI models, as well as minimize possible biases. Thus, restrictions on data flows can slow AI innovation and development, increase costs for firms, and negatively impact trade in AI-enabled products. A recent study (OECD and WTO, 2024) found that if all economies fully restricted their data flows, this could result in a 5 per cent reduction in global GDP and a 10 per cent decrease in exports. However, the large datasets required by AI models raise significant privacy concerns. Therefore, a reasonable trade-off between accessing large amounts of data to train AI models and protecting individual privacy must be found.

Ensuring that AI is trustworthy without hindering trade can be challenging. "AI trustworthiness" means that it meets expectations in terms of reliability, security, privacy, safety, accountability and quality in a verifiable way. However, given the behaviour and opaque nature of AI systems, as well as the potential dual-use of some AI products (i.e., for both civilian and military applications), striking a balance between ensuring that AI is trustworthy and enabling trade to flow as smoothly as possible may prove especially challenging. The evolutionary nature of AI makes regulation a perennial moving target. "Traditional" regulations and standards for goods, which normally focus on tangible, visible and static product requirements, may not be fully capable of addressing all of the different types of potential risks, including the ethical and societal questions that may result from the integration of AI into goods and services. Regulating to address questions

of public morals, human dignity and other fundamental rights, such as discrimination or fairness, is not only challenging, but is also prone to causing regulatory fragmentation because the meaning and relative importance of such values may vary across societies.

AI also poses new conceptual challenges for the traditional, "human-centric" approach to IP rights. Issues that deserve particular attention include the protection of AI algorithms and of copyrighted material for training AI, and the protection and ownership of AI generated outputs. These questions may call for a re-evaluation of existing IP legal frameworks.

The immense potential of AI has prompted governments around the globe to take action to promote its development and use while mitigating its potential risks. At the domestic level, more and more jurisdictions are putting in place AI strategies and policies to enhance their AI capabilities. The number of economies having implemented AI strategies increased from three in 2017 to 75 in 2023. According to Stanford University's 2024 "AI Index", 25 AI-related regulatory measures were adopted in the United States in 2023, compared to just one in 2016, while the European Union has passed almost 130 AI-related regulatory measures since 2017. However, most domestic AI policy initiatives are being implemented by developed economies, which could further deepen the existing AI divide between developed and developing economies: while around 30 per cent of developing economies have put AI policy measures in place, only one least-developed country (LDC) – Uganda – has done so according to data from the Organisation for Economic Co-operation and Development (OECD) AI Policy Observatory. Also high on governments' policy agendas are domestic initiatives to promote access to data through open data and data-sharing initiatives, with a view to fostering domestic innovation and competition, protecting privacy and controlling the flow of data across borders.

What is emerging is a landscape of fragmented measures and heterogeneous domestic initiatives, which may lead to regulatory fragmentation. This fragmentation extends beyond AI-specific regulations to include sector-specific legislation, such as IP and data regulations, which also impact AI. In addition, the design of some border measures imposed on the hardware components and raw materials crucial to AI systems can affect competitors in other economies, leading to trade-distorting effects and further exacerbating fragmentation. The economic costs of regulatory fragmentation, in particular for small businesses, highlight the importance of mitigating regulatory heterogeneity; according to OECD and WTO (2024), the economic costs of the fragmentation of data flow regimes along geo-economic blocks amount to a loss of more than 1 per cent of real GDP.

The increasing number of bilateral and regional cooperation initiatives on AI governance, many focusing on different priorities, add to the risk of creating a multitude of fragmented approaches.

For example, while some bilateral cooperation initiatives focus primarily on aligning AI-related terminology and taxonomy, and on monitoring and measuring AI risks, others prioritize collaboration to promote alignment in general terms or focus primarily on AI safety and governance. Likewise, some regional initiatives prioritize human rights and ethics, while others focus on economic development and growth.

Regional trade agreements (RTAs) and digital economy agreements are important vehicles to promote and regulate AI. AI-specific provisions have started to be incorporated into such agreements, but they mainly take the form of "soft" – i.e., non-binding – provisions focusing on the importance of collaboration to promote trusted, safe and responsible use of AI. Several AI-specific provisions explicitly refer to trade. Digital trade provisions included in RTAs, such as provisions on data flows, data localization, protection of personal information, access to government data, source code,[2] competition in digital markets, and customs duties on electronic transmissions, are also important for AI development and use. The number of RTAs with digital trade provisions has been growing steadily since the early 2000s, and by the end of 2022, 116 RTAs – representing 33 per cent of all existing RTAs – had incorporated provisions related to digital trade (López-González et al., 2023). However, the depth of digital trade provisions included in RTAs varies significantly, reflecting diverging approaches. Few developing economies and LDCs have negotiated digital trade provisions. Disciplines on trade in services in RTAs are also an important channel through which governments' trade policies and trade obligations can affect the policy environment for AI, but the level of commitments undertaken differs significantly across economies.

The last few years have witnessed a wave of international initiatives related to AI. While there are elements of complementarity among such initiatives and alignment on core principles, different initiatives prioritize different aspects of AI governance. A number of initiatives also contain various common elements that have important trade and WTO angles, such as the recognition of the role of regulations and standards, the need to avoid regulatory fragmentation, the importance of IP rights, the importance of privacy, personal data protection and data governance, and the importance of international cooperation, coordination and dialogue. Several of these initiatives also address the environmental impacts of AI.

However, there is still no global alignment on AI terminology. Differing priorities, the overlap between initiatives, and lack of global agreement on key terminology could pose challenges at the implementation stage, limiting efforts to prevent fragmentation and to put in place a coherent global AI governance framework. Nevertheless, beyond initiatives to govern AI, an increasing number of international organizations, such as the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Industrial Development

Organization (UNIDO) and the World Bank, are developing courses on AI and integrating AI in their technical assistance activities, some of which have a trade component.

The WTO, as the only rules-based global body dealing with trade policy, can contribute to promoting the benefits of AI and limiting its potential risks. It can play an important role in limiting regulatory fragmentation, promoting the development of trustworthy AI and access to it, and facilitating trade in AI-related goods and services, thereby enabling the growth of AI and promoting innovation through IP.

What role for the WTO?

WTO rules and processes promote global convergence. The WTO is a forum that promotes transparency, non-discrimination, discussion, the exchange of good practices, regulatory harmonization, non-mandatory policy guidance, and global alignment through the negotiation of new binding trade rules on trade. Transparency provisions included in WTO agreements allow WTO members, as well as economic operators and consumers, to be kept abreast of latest regulatory developments. One example is the enhanced transparency provisions in the Technical Barriers to Trade (TBT) Agreement. By requiring early notification of regulatory measures and allowing opportunities to provide comments on these measures at a draft stage, the TBT Agreement can help to prevent obstacles to trade, as well as promote and accelerate global convergence. WTO members are increasingly notifying a wide range of regulations on digital technologies to the TBT Committee. For instance, more than 160 notifications have been made on regulations addressing cybersecurity and the Internet of Things (IoT)/robotics, both of which are relevant for AI. More recently, the TBT Committee has started receiving notifications of AI-specific regulations. Another example is the WTO Trade Policy Review Mechanism, which contributes to transparency in members' trade policies. Finally, in terms of possible new substantive rules, various issues negotiated under the Joint Statement Initiative on E-commerce, which currently brings together 91 WTO members, may matter for AI.

The WTO also provides a global forum for constructive dialogue, the exchange of good practices, and cooperation. This enables discussion among members of how best to design nuanced, flexible and adaptable regulatory solutions to address the goods, services and IP-related aspects of AI in a coordinated manner. In some areas, the WTO also promotes regulatory harmonization and coherence by encouraging the use of international standards, mutual recognition and equivalence, and through various "soft law" instruments, such as voluntary committee guidelines.[3]

The WTO is the cornerstone of global efforts to facilitate trade in services and goods that enable or are enabled by AI. Various aspects of the WTO rulebook can contribute to promoting the development of and access to AI. For example, the General Agreement on Trade in Services (GATS) plays an important role in shaping a policy environment that facilitates the development and uptake of AI. A majority of WTO members (out of 141 schedules of commitments, 84, or 60 per cent, contain commitments on computer services) have made specific commitments on market access and national treatment related to ICT services, which play a fundamental role in enabling and promoting AI. However, commitments in other sectors remain limited, and barriers to services trade remain high in overall terms. When it comes to goods, the Information Technology Agreement (ITA) aims to increase worldwide access to high-technology goods essential to AI by eliminating tariffs on the ICT products it covers. Meanwhile, the TBT Agreement can help to ensure that, when governments adopt AI standards and regulations, these are, to the extent possible, not trade-restrictive, and are optimal for attaining policy objectives. The Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement aims to foster a balanced IP system that incentivizes innovation through the enforcement and protection of IP rights, while promoting dissemination of and access to technology, to the mutual benefit of both producers and users of technological knowledge. Various WTO agreements also include provisions to promote the transfer of technology, and this can play an important role in the development of AI. Finally, the WTO Agreement on Government Procurement (GPA) 2012 promotes access to internationally available new AI technologies.

Various principles, provisions and guidelines in the WTO rulebook can support trade in AI systems and AI-enabled products by minimizing international negative spillovers. Examples include the non-discrimination principle and the Agreement on Trade-Related Investment Measures (TRIMS), which recognizes that certain investment measures can restrict and distort trade and states that members may not apply investment measures that discriminate against foreign products or lead to quantitative restrictions. When it comes to technical regulations, standards and certification procedures, the TBT Agreement provides that regulatory intervention shall not be discriminatory nor any more trade-restrictive than necessary to achieve the intended policy objectives, and that it should, when justified, be subject to periodic reviews. And the Agreement on Subsidies and Countervailing Measures (SCM) can play a crucial role in navigating the dual aspects of AI development, by promoting technological innovation while preventing negative spillovers in international trade from government financial support.

The WTO can help to prevent and settle trade tensions and frictions. The practice of raising "specific trade concerns" (STCs) allows WTO committees to serve as a venue for defusing potential trade tensions with regulatory measures in a cooperative, pragmatic and non-litigious way. In the TBT Committee, for instance, members have already been using this practice

to discuss and address concerns with regulations involving a wide range of digital technologies and issues, including IoT, autonomous vehicles, 5G in robotics, industrial automation, cybersecurity, and more recently AI. The WTO also serves as a global forum to settle trade-related disputes. While there has been no dispute on AI so far, the WTO Dispute Settlement System has dealt with resolving disputes related to various aspects of the digital economy.

The WTO promotes inclusiveness through special and differential treatment and technical assistance for developing economies. WTO agreements recognize the constraints faced by developing economies and, for this reason, include various special and differential (S&D) treatment provisions to help them to implement WTO rules and participate more effectively in international trade. Technical assistance and capacity-building are key pillars of the WTO's work and play a fundamental role in furthering understanding of the WTO rules and agreements, as well as of other topics relevant to trade. Multi-stakeholder programmes, such as Aid for Trade and the Enhanced Integrated Framework, could, however, be leveraged further to help developing economies seize the benefits of AI for trade.

As a forum for negotiation, discussion and rule-making, the WTO provides a multilateral framework that can help address the trade-related aspects of AI governance. Nevertheless, AI may have implications for international trade rules. Although it is a new technology, AI is developing rapidly, and is certainly already advanced enough to be a subject of discussions at the WTO. Its cross-cutting nature requires a cross-cutting policymaking approach to promote policy coherence.

While AI governance extends beyond trade, trade remains a crucial element within AI governance. The WTO can contribute significantly to developing a robust AI governance framework. This report is a first attempt to explore some key implications of AI for trade and trade rules. As AI continues to evolve, governments should continue to discuss the intersection of AI and trade and its possible implications for the WTO rulebook.

Endnotes

1 Simulations in this report define digitally delivered services as services that can be delivered remotely over computer networks, (WTO et al., 2023).

2 See Annex 1 for further explanation of key concepts in AI.

3 Such "soft law" instruments also include the set of Principles for the Development of International Standards, Guides and Recommendations agreed by the TBT Committee in 2000 (the "Six Principles") and the TBT 2024 Conformity Assessment Procedures (CAP) Guidelines.