Centre for International Governance Innovation

Special Report

AI-Driven Productivity Scenarios

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Acronyms and Abbreviations

5G	fifth-generation
AGI	artificial general intelligence
AI	artificial intelligence
APIs	application programming interfaces
ASEAN	Association of Southeast Asian Nations
AutoML	automated machine learning
FDI	foreign direct investment
FII	foreign institutional investor
GDPR	General Data Protection Regulation
GPUs	graphic processing units
IMF	International Monetary Fund
IP	intellectual property
LLMs	large language models
MFP	multifactor productivity
MLOPs	machine-learning operations
OECD	Organisation for Economic Co-operation and Development
PPPs	public-private partnerships
R&D	research and development
SMEs	small and medium-sized enterprises
STEM	science, technology, engineering and mathematics
TPUs	tensor processing units
UAE	United Arab Emirates
WIPO	World Intellectual Property Organization

Executive Summary

Recent technological advances in artificial intelligence (AI), combined with weak economic growth projections, turn a spotlight to strategies that advance AI in a manner that can boost productivity. The transformative potential of this dynamic is of growing importance within G7 countries and across them, as well as vis-à-vis economic competitors.

While acknowledging that some data quality and lag issues persist in measuring productivity, this special report draws on established international AI-related indices to identify three key conduits that link AI-related actions and improved productivity outcomes: technological capabilities; applications and markets; and policy and regulation.

Based on the three conduits, the report provides a country-level assessment of G7 countries (plus China and India) to outline a current snapshot of AI-driven productivity in each. Heat mapping shows that, overall, G7 countries are generally well positioned on data infrastructure and research and development (R&D), as well as on some sector-specific applications and standards. G7 countries are typically less well positioned on ensuring the required labour and talent pool is in place, which relies heavily on immigration, attraction and retention. Limitations in market scaling and access to large pools of private capital for small and medium-sized enterprises (SMEs) may also be limiting factors on the horizon, raising opportunities for demand-side subsidies.

The analysis of current country-level conditions informs plausible futures for AI's impact on productivity. To contextualize large uncertainties surrounding the evolution of AI in the economy, the report also examines four different scenarios: flat AI; US-led AI; multipolar AI; and artificial general intelligence (AGI). These scenarios broaden the scope for G7 members to consider key areas to potentially act upon that could boost productivity under different circumstances. Overall, the scenarios provide a rationale for exploring greater G7 coordination on AI data security and integrity, and potentially on infrastructure, to further secure systems and leverage economic growth.

Appendix 3 provides a summary of key takeaways, tailored for G7 policy makers.

Introduction

Geopolitics continues to drive a tumultuous and uncertain period of change. Technological development and diffusion are transforming economic, financial and societal systems. Many facets of change are so rapid that policy makers around the world may at times feel like bystanders, with policy and legal frameworks unable to keep pace with approaches that maximize opportunities and manage risk.

While G7 countries have strong policy and regulatory capacities compared to most other countries, the nimbleness of their legislative systems to handle the nature of new digital and data-driven technologies including AI is being fundamentally tested. And unlike with physical goods, where cross-border flows can be readily tracked, intangible products such as AI large language models (LLMs) can diffuse rapidly and operate across borders at unprecedented scale and speed. Global production is reorganizing to adapt to these realities as reflected in strong increases in cross-border payments for the use of intellectual property (IP), which is trade in ideas such as software and AI technologies.

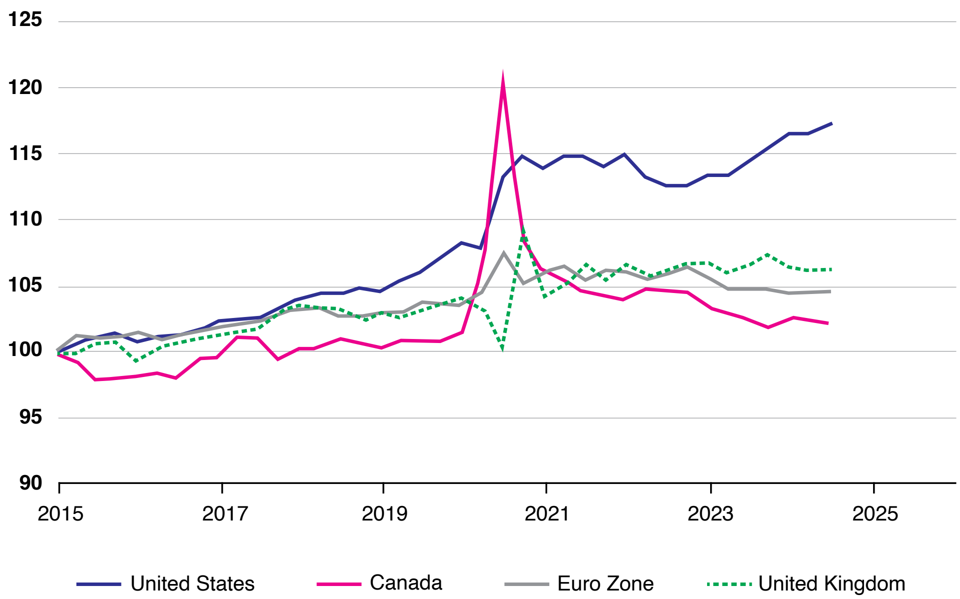
In addition, the cross-border nature of technologies such as AI requires enhanced international cooperation to facilitate a greater sharing of the benefits and ensure downside risks are minimized. As a result, G7 countries need to upgrade AI strategies within their own borders, increase coordination among themselves and champion approaches that feed into global frameworks that increase shared benefits and minimize negative spillovers.

This special report focuses on a specific element of AI's transformative potential that the G7 and all countries now face: the impact on productivity. The same turbulence and uncertainties noted above apply to economic growth and productivity. Together, lacklustre economic growth and rapidly advancing AI technologies create an urgent need to better understand scenarios of how AI is evolving and its implications for productivity.

AI technologies, especially much more advanced AI, have the potential to reshape how productivity is generated altogether. Since the rebound from the COVID-19 pandemic, the United States has seen a striking acceleration in labour productivity, widening the gap with other advanced economies (see Figure 1). US labour productivity has grown, driven by strong business investment, technological adoption and a more dynamic labour market in the intangible economy. In contrast, other advanced economies have experienced weak or even negative labour productivity growth, likely reflecting slower technology diffusion and slower labour adjustment.

Labour productivity (output per hour worked) can rise even if workforces shrink, but without multifactor productivity (MFP) gains, efficiency stagnates — suggesting a limit to labour-based growth strategies. If AI adoption follows similar patterns, the United States could pull even further ahead, leveraging automation and digital tools more effectively than its peers. Where there is lagging productivity, policy makers must ensure that AI is deployed not just for short-term labour cost reductions, but as a catalyst for deeper efficiency gains — enhancing business dynamism, capital efficiency and overall economic resilience.

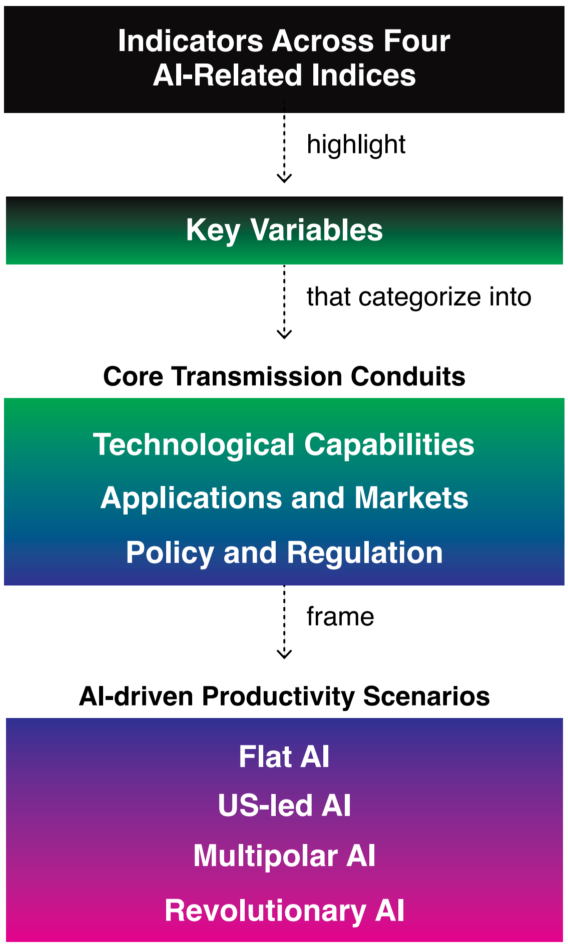
Figure 1: US Labour Productivity Pulling Ahead (Output per Hour, Indexed to 100 (1/1/15))



Source: Joseph Wu (2024), VP and Portfolio Manager, Multi-Asset Strategy with RBC Wealth Management's Portfolio Advisory Group. Reproduced with permission.

The road map of this special report (see Figure 2) serves as a methodology to glean insights on how AI can impact productivity, particularly as relevant to G7 countries. The analysis began by studying the indicators within AI-related indices to reveal the data-driven metrics that track AI's transformative power. With the intention of identifying the aspects of AI that can impact productivity, these indicators, as well as other variables identified by the authors but not captured by the indices, generally highlight the key variables for AI-driven productivity that can be categorized into three core transmission conduits: technological capabilities, applications and markets, and policy and regulation. Furthermore, geopolitics is intrinsic to the variables and conduits described above. With that in mind, countries can strategically dial these key variables to optimize the impact of AI on productivity. Later in this report, a country-level analysis using this methodology helps identify strengths and gaps in leveraging AI for its productivity potential. The analysis of current country-level conditions informs us of the plausible future for AI's impact on productivity. Four scenarios in particular are explored, identifying priorities for optimizing the path forward.

Figure 2: Road Map for AI-Driven Conduits and Scenarios



Source: Authors.

Definitions of AI and Productivity

Humans have long imagined and feared the possibility of AI, but it was the development and widespread use of more complex machines during the Industrial Revolution that solidified a latent apprehension that machines might one day replace us. Following the advent of modern computers, attention focused on the potential of a manufactured machine that could match or even surpass human capabilities. The famous Turing test of machine intelligence was proposed in 1950, and the term "artificial intelligence" was coined soon after. Since that time, AI has often suffered from wildly high expectations and overly optimistic predictions and has experienced a regular succession of booms and busts.

However, over roughly the past decade, three key developments have combined to push AI into a renewed boom phase, and one that seems to be the most significant yet:

- Continued exponential growth in computing power (Moore's law) has provided unprecedented abilities for increasingly complex algorithms, as well as significant efficiency and cost advantages for developing and running AI applications.
- Advancements in different branches of AI, including machine learning and deep learning, have enabled multimodal applications for AI such as image, text, video and voice generation and many others. In addition, the user interface is now simple.
- Enormous quantities of data are now available on the internet for AI models to scrape and use (although that use is being challenged via copyright lawsuits).

All three of these developments — compute power, AI techniques and the availability of mass data — were essential to AI going mainstream via accessible generative AI tools. Applications such as ChatGPT would not have achieved the same level of success without the combination of all of these elements.

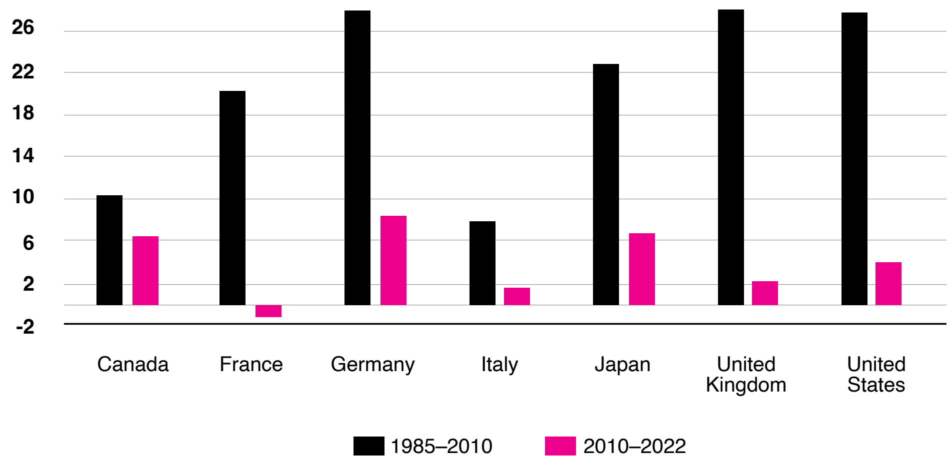
The Organisation for Economic Co-operation and Development (OECD) updated its definition of AI in 2023 to ensure it remained relevant and technically sound, presumably following the explosion of generative AI use: "An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment" (OECD 2024a, 4).

For the purposes of this special report, the focus is on two different levels of AI: narrow AI (AI designed to complete actions comparable to or above human levels for narrow cognitive tasks, but that is unable to independently operate or learn); and AGI (AI designed to learn and perform actions at or above human levels for almost all cognitive tasks). Consideration of artificial super intelligence (AI able to surpass the knowledge and capabilities of humans on all cognitive tasks) is not considered in this report.

The OECD notes that productivity is commonly defined as "a ratio between the volume of output and the volume of inputs. In other words, it measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output. Productivity is a key source of economic growth and competitiveness" (OECD 2024b, 5). The analysis in this report assumes an MFP lens, which includes intangibles such as competition as well as the adoption of new technologies including AI.

MFP measures efficiency in using both labour and capital, not just labour, making it a better indicator of AI's transformative impact. If AI or AGI takes off, human labour and traditional productivity metrics could decouple, making MFP a key measure to track AI-driven productivity improvements beyond just labour input. The slowdown in MFP (see Figure 3), although likely skewed by impacts of the global pandemic, supports the argument that traditional growth engines, including capital and labour, are losing effectiveness, reinforcing the argument that AI adoption is crucial to achieving high rates of productivity and economic growth in G7 countries.

Figure 3: Growth of MFP Across G7 Countries (%)



Data source: OECD data archive (2024).

Economic Growth and Productivity Projections Weak for G7 and Other Countries

The International Monetary Fund's (IMF's) October 2024 *World Economic Outlook* projected 2025 global economic growth to remain stable yet underwhelming and stated that "absent a strong drive for structural reforms, output growth is expected to remain weak over the medium term," noting structural challenges including "historically low total factor productivity growth" (IMF 2024, 14). For its part, the *OECD Compendium of Productivity Indicators* (OECD 2024b) suggests that a set of multifaceted challenges remain on the horizon — including energy, trade and supply chain disruptions, inflation, debt and financial conditions — and therefore, looking forward, the baseline prospects for improved economic growth and productivity remain relatively weak. Importantly, these broad challenges will also play into G7 countries' capacity to invest in new technologies such as AI, since technology is a core factor in driving productivity growth.

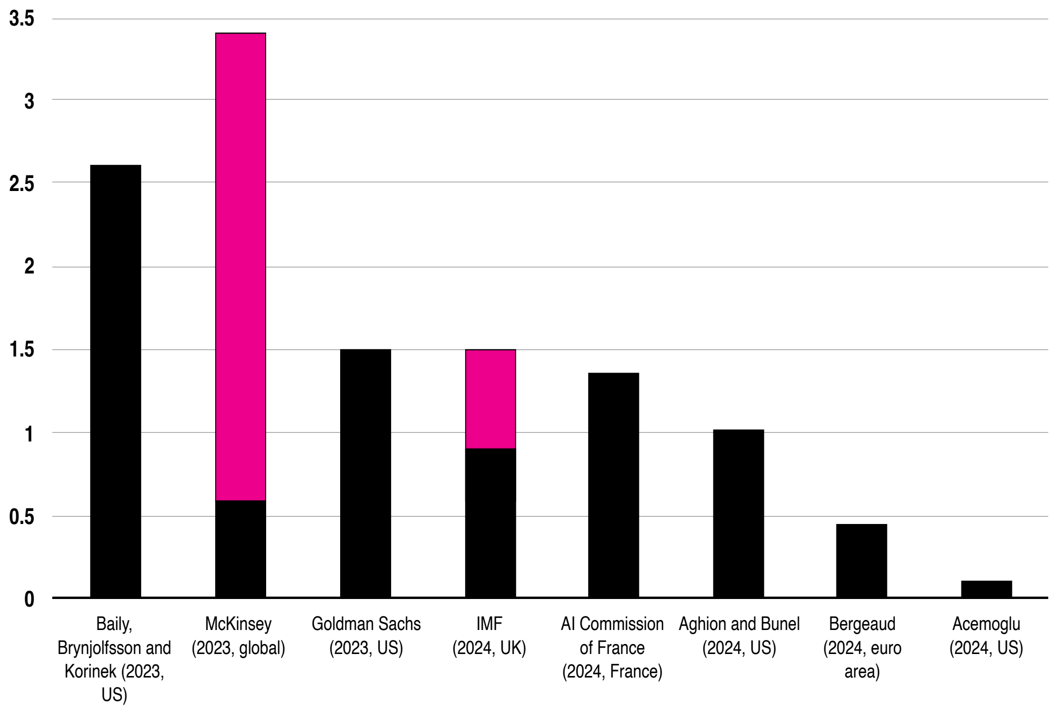
More fundamentally, as economic growth has slowed in recent years, some economists have argued that advanced economies recently reached a stage of overall stagnation and would not again experience the economic booms or productivity gains of the past due to slowing rates of innovation and a range of persistent headwinds. The core issue is, therefore, whether AI has the potential to be a general-purpose technology at least on par with other massive technological breakthroughs in the past.

Robert Gordon's (2017) seminal empirical analysis on the history of US economic growth, in which he examines the impact of different industrial revolutions, is helpful historical context. Gordon focused on three industrial revolution phases in the United States: steam and railroads from 1750 to 1830; electricity, the internal combustion engine, running water, indoor toilets, communications, entertainment, chemicals and petroleum from 1870 to 1900; and computers, the internet and mobile phones from 1960 to 2017. He found that the relatively short second phase (1870 to 1900) was primarily responsible for the relatively rapid productivity growth between 1890 and 1972 and was driven by the three central inventions of electricity, the combustion engine and indoor plumbing (Gordon 2012, 1).

The overall conclusion of Gordon's book (2017) is very skeptical about the prospects for strong future productivity growth, forecasting stagnation due to new headwinds in demographics, education, inequality, globalization, energy/environment and debt. As analysis by the World Bank has shown, most of these headwinds have grown worse following the negative impacts of the COVID-19 pandemic in advanced economies and especially in emerging and developing economies (Dieppe 2021).

Today, many economists are looking at the potential impact of AI on economic growth and productivity, and a number remain skeptical about large positive impacts. The OECD, an established leader on AI analysis and measurement, has published its own novel framework to estimate AI's aggregate productivity effects over 10 years and includes a snapshot of the findings of other models reproduced below in Figure 4.

Figure 4: AI's Predicted Macro-level Productivity Gains Vary Substantially Across Studies — Predicted Increase in Annual Labour Productivity Growth over a 10-Year Horizon Due to AI (in Percentage Points)



Source: Filippucci, Gal and Schief (2024, 8).
Notes: This is an adaptation of a figure in an original work published by the OECD. Pink represents upper bounds of the estimate See original work for sources given in the figure.

AI Is Transformative, but the Productivity Data Lags

Do the skeptical arguments about future productivity growth still hold in the age of AI? A case can be made that revolutionary technology disruption throughout history is the rule rather than the exception; it has generally been accelerating into the current decade and could speed up considerably driven by AI (Roser 2023). Why would challenges prevent significant new discoveries and innovation, even if they occurred with less frequency? Moreover, if AI is a revolutionary technology that will feed on itself and accelerate innovation, would it not be well suited to finding ways to adapt to the challenges of secular stagnation?

A number of economists assert that the secular stagnation headwinds discussed above will not fully hold back AI as a powerful breakthrough general-purpose technology that will drive a new wave of growth. Italy's G7 High-Level Panel of Experts report *Artificial Intelligence and Economic and Financial Policy Making* views AI as transformative to many parts of the economy — similar to the way that mechanization transformed agriculture, and the assembly line changed manufacturing — and that a resurgence could be driven by two key mechanisms: "1. Increased productivity: AI's ability to automate and enhance the production of goods and services; and 2. Accelerated innovation: AI's potential to generate new ideas, products, and forms of organization, thereby fostering long-term economic growth" (Videgaray et al. 2024, 27).

Erik Brynjolfsson is among the most widely cited economists suggesting that an AI-driven productivity boom is on the horizon (Brynjolfsson and Petropoulos 2021). The argument is broadly based on three main tenets: that AI unleashes a new wave of applications that equal or surpass human-level abilities on a number of cognitive tasks; that a time lag should be expected before the data shows the productivity results, since the economics of transformative technologies follow a J-curve, where the early productivity impacts are slow to take hold at the firm level and only take off when whole new processes and products are introduced over a number of years (Brynjolfsson, Rock and Syverson 2017); and the experience of COVID-19 and the economic bounce back that followed (particularly in the United States) have made it harder to find workers for many tasks, thereby increasing incentives for businesses to adopt new technologies for their productivity potential.

Anton Korinek (2023) emphasizes the critical role of human capital adjustments in determining how quickly AI's productivity potential is realized. Others stress the need for even distribution of AI diffusion throughout the economy to maximize its impact (Baily, Brynjolfsson and Korinek 2023). OECD scenarios (Filippucci, Gal and Schief 2024) for AI impact on aggregate productivity consider the degree of adoption, expansion of AI capabilities, sector-specific impacts and reallocation of labour and capital as key categories for assumptions underlying their scenarios. With more detailed modelling, these scenarios could go further to consider additional channels for AI's impact, such as AI adoption in different parts of the economy, physical capital accumulation, innovation-boosting effects and labour market implications. They note "the importance of policies, institutions, and economic structures in reaping the benefits of technological change" (ibid., 41). Short-term discrepancies between technological innovation and productivity metrics support the use of a scenario exercise that goes beyond the short term to qualitatively explore the components of AI and its ecosystem that can drive productivity gains.

How Transformative and Scalable Are AI Capabilities?

How far will AI go? The year 2023 was a watershed moment for AI, when combined advancements in compute power, generative AI algorithms and large data sets created powerful and accessible AI chatbots and made them broadly available. The world took notice, and AI entered an entirely new phase of development. A further inflection point may be emerging following the release of several Chinese AI models in 2025, including DeepSeek R1 (Butts 2025). These new AI models were reportedly trained at a very low cost with excellent user results, compared to the LLMs created by, for example, OpenAI, Meta and Google (Yang 2025). If sheer computation horsepower is no longer a prerequisite for success in developing an LLM, going forward, strategy should overtake large-scale investment and open the door for smaller companies, and many more countries, to take active positions.

The hype in the media around the problems and risks that come with the frequent "hallucinations" in the AI applications, as well as the prospects for AI taking over everything, often drowned out more sober assessments of progress and challenges. The Stanford *Artificial Intelligence Index Report 2024* summarized the state of play well, based on 2023 data: "Progress accelerated in 2023. New state-of-the-art systems like GPT-4, Gemini, and Claude 3 are impressively multimodal: They can generate fluent text in dozens of languages, process audio, and even explain memes. As AI has improved, it has increasingly forced its way into our lives. Companies are racing to build AI-enabled products, which are seeing growing adoption among the general public. But current AI technology still has significant problems. It cannot reliably deal with facts, perform complex reasoning, or explain its conclusions" (Stanford Institute for Human-Centered Artificial Intelligence 2024, 3).

This summary is instructive in several respects. First, it shows how quickly AI technologies have advanced in some areas over several version iterations, while the limitations are still very prominent. Second, the report based on 2023 information was already dated as soon as it was released (April 2024) since technology development is moving so quickly. For example, in September 2024, OpenAI released model o1 that can "reason" and work through more complex tasks and solve harder problems than previous models in science, coding and math (OpenAI 2024), though it still struggles with basic visual commonsense tasks, limiting its practical reasoning capabilities.

What Are the Likely Limitations on Further AI Scaling?

There is much debate about the constraints that AI, especially LLMs, face in their further development. It is helpful to consider four areas of potential constraint beyond policy, regulatory and legal limits, which have so far had minimal discernible impact on AI development. These are data, chips, energy and training latency. The research group Epoch AI analyzed in detail these four parameters as potential bottlenecks and concluded: "Based on current trends, training runs of up to 2e29 FLOP will be feasible by the end of this decade. In other words, it is likely feasible, by the end of the decade, for an AI lab to train a model that would exceed GPT-4 in scale to the same degree that GPT-4 eclipses GPT-2 in training compute….Overall, these constraints still permit AI labs to scale at 4x/year through this decade, but these present major challenges that will need to be addressed to continue progress" (Sevilla et al. 2024).

The upper constraints the researchers identified were due to energy limitations, including at the grid level, and limited capacity to manufacture enough specialized chips. On data, while acknowledging that potential copyright restrictions for use in LLMs are still playing out, the analysis does not see a significantly constraining "data wall" over the next five years due to the availability of new data from other modalities and usable synthetic data generation.

An alternative view sees constraints on LLMs as the result of diminishing returns on the quality of outputs since these models lack sufficient reasoning capability and are not sufficiently aligned with social needs and ethical considerations (Marcus 2025).

Description of Methodology, Drawing on AI-Related Indices

The authors' approach to exploring AI-driven productivity scenarios for the G7 was established by identifying core transmission conduits through which AI will impact national productivity frontiers. These conduits are key to describing just how, for example, a scenario that yields high productivity gains could manifest and were identified through an analysis of four established AI-related indices.

Indices that track AI metrics at a national level (see Table 1), including the Stanford Global AI Vibrancy Tool,[1] the Oxford Insights Government AI Readiness Index,[2] the IMF AI Preparedness Index[3] and the World Intellectual Property Organization (WIPO) Global Innovation Index,[4] systematically organize various indicators of AI development and its broader ecosystem into categorical frameworks, offering insight into where it is expected that AI's transformative potential will transmit through to productivity measures. To identify key conduits relevant for AI-driven productivity, an examination of each AI index was conducted cross-analyzing their high-level components, down to specific indicators. As a result, the three core transmission conduits through which AI can influence productivity are identified as: technological capability, applications and markets, and policy and regulation (see Appendix 1). Further, the realization of AI benefits on productivity is contingent on the development of a robust and equitable AI ecosystem. Within each conduit, a comprehensive set of interdependent variables is identified as key to forming AI's impact on productivity.

Table 1: G7 Country, China and India Rankings Across AI-related Indices

G7	Stanford Global AI Vibrancy Tool (2023)	IMF AI Preparedness Index (2023)	Oxford Insights Government AI Readiness Index (2023)	WIPO Global Innovation Index (2024)
Canada	14	18	5	14
France	6	22	6	12
Germany	8	9	8	9
Italy	22	36	26	26
Japan	9	12	9	13
United Kingdom	3	13	3	5
United States	1	3	1	3
China	2	30	16	11
India	4	71	40	39

Source: Authors.

Technological capability is emphasized in the Stanford, IMF, Oxford Insights and WIPO indices through measures of R&D, digital infrastructure and hardware, shaping AI's role in productivity growth. Applications and markets are captured through indicators such as AI investment, digital adoption and business integration, bridging innovation with real-world economic impact. Policy and regulation serve as critical enablers, with all indices incorporating governance-related conduits to align AI's disruptive potential with long-term societal and economic goals.

While the authors acknowledge the value of these indices, they each favour certain variables through their methodological weighting of indicators and therefore show an incomplete picture of how nations are leveraging AI. The Stanford Global AI Vibrancy Tool emphasizes R&D, infrastructure and the

1 See https://hai.stanford.edu/ai-index/global-vibrancy-tool.

2 See https://oxfordinsights.com/ai-readiness/ai-readiness-index/.

3 See www.imf.org/external/datamapper/datasets/AIPI.

4 See www.wipo.int/gii-ranking/en/.

economy in terms of AI talent/skills, which favours China, India, the United Kingdom and the United States. However, it underweights factors related to AI accessibility and equitable diffusion, which may disadvantage emerging economies with strong adoption potential but weaker R&D, such as Brazil or Indonesia (both G20 countries).

The IMF AI Preparedness Index focuses on preparedness in terms of digital infrastructure, human capital and labour market policies, innovation and economic integration, and regulation and ethics. This favours countries with established financial and institutional frameworks such as Germany or the United States, overlooking the role of informal AI-driven innovation in emerging economies such as India or the state-driven innovation in China.

The Oxford Insights Government AI Readiness Index evaluates governments, the technology sector and data and infrastructure, benefiting governance-focused countries with sophisticated innovation such as Canada or the United Kingdom. However, it still may not fully capture private-sector-driven AI advancements or commercialization in more decentralized AI ecosystems such as China.

WIPO's Global Innovation Index looks beyond AI development and at innovation more broadly, studying countries' innovation inputs and outputs, including institutions, human capital and research, infrastructure, market and business sophistication, knowledge, technology and creativity, but its broad approach may dilute AI-specific insights, giving greater weighting to traditional innovation metrics. This benefits highly diversified innovation economies such as Germany or Switzerland, but dilutes economies with strong AI-innovation but weak traditional R&D such as India.

Key Variables and Core Transmission Conduits of AI's Transformative Potential

The following section looks at country-level analysis and considers the key variables common to these indices (see Figure 5), as well as some other variables not captured.

Figure 5: Core Transmission Conduits and Key Variables

A Technological Capability

A.1. Data infrastructure: Availability of high-quality, diverse data sets; robust broadband penetration; data centres and cloud infrastructure; comprehensive data governance framework

A.2. Hardware and compute ecosystem: Design and fabrication of semiconductors, GPUs, TPUs and advanced technologies; supply chain resilience; advancements in semiconductor technology nodes

A.3. R&D: High-calibre academic institutions and research centres; investments in AI publications, patents and Ph.D. graduates; funding for foundational research; development of transformative architectures (e.g., transformers, diffusion models), open-source frameworks and standardized tool kits for broad adoption

A.4. AI software, tools and infrastructure: Availability of cloud service providers and specialized platforms (e.g., MLOps, AutoML); integration with global AI ecosystems; middleware solutions, APIs and libraries bridging research to real-world applications

B Applications and Markets

B.1. Sector-specific AI applications: Emerging AI applications tailored to sectors such as health care, fintech, agriculture and manufacturing; optimizing resource use and enhancing productivity

B.2. Investments: Vibrant corporate ecosystems with big tech companies, start-ups and venture capital availability; supportive regulatory environments enabling commercialization

B.3. Market maturity and scale: Mature start-up ecosystems; large consumer markets attracting global talent, investment and IP creation; providing testing grounds for AI applications

C Policy and Regulation

C.1. Labour and talent pool: Robust pipeline of AI experts; well-trained technical workforce; policies encouraging immigration of skilled professionals; investments in STEM education

C.2. Domestic regulations and standards: Clear governance frameworks encouraging innovation while ensuring ethical AI use and IP protection; transparent compliance mechanisms to foster trust among businesses and consumers and through the development of tax incentives

C.3. International regulations and standards: Participation in international AI alliances; leadership in global standard setting; shaping norms for compatibility and competitiveness in global markets

Source: Authors.
Note: APIs = application programming interfaces; AutoML = automated machine learning; GPUs = graphics processing units; MLOps = machine-learning operations; STEM = science, technology, engineering and mathematics; TPUs = tensor processing units.

Technological capability captures the resources and technical infrastructure required for AI development, including various components of data infrastructure, hardware and compute ecosystems, R&D and AI software tools, platforms and infrastructure. The ability to process and access data, and the quality and volume of data, will influence how effectively AI can innovate its technical capabilities. The capacity and sophistication of hardware and compute ecosystems are factors that will impact the scale and speed of AI innovation, including broadband penetration to ensure efficient data flow and connectivity, or data centres and cloud infrastructure to provide the storage and processing capacity required to scale. The design and manufacturing of advanced semiconductors, graphics processing units (GPUs), tensor processing units (TPUs) and other necessary technologies underpin AI's computational capabilities.

It is important to note that while R&D incentives address innovation supply, firms often underinvest in adoption due to upfront switching costs, integration complexity and uncertain short-term returns. These frictions, coupled with the broader societal value of AI adoption, such as increased service quality, inclusion and productivity, justify targeted incentives, especially for SMEs. Adoption subsidies, including tax credits for digital modernization or automation-linked investments, could help overcome inertia and unlock positive spillovers across sectors.

High-calibre academic and research institutions drive breakthroughs in AI technology. Investments in AI publications, patents and the cultivation of Ph.D. graduates in AI-related fields are critical for a country's R&D strength. Public and private sector funding for AI research ensures sustained progress in AI capabilities and supports long-term innovation. Cloud service providers and specialized platforms, such as MLOps (machine-learning operations) (Krishnakumar, n.d.) and AutoML (automated machine learning) (Idress 2024), play a pivotal role in streamlining AI deployment and scaling. Cross-border integration with other AI ecosystems fosters network effects and scalability, enabling organizations to leverage shared tools, resources and expertise.

As technological capability develops, AI may reach new forms of human capital accumulation through advancements that achieve or surpass human function, further driving productivity frontiers. Factors such as energy, data and specialized chips will be the primary bottlenecks in the medium term, with ongoing advancements in chip manufacturing, energy consumption and data access crucial for AI's continued growth. Together, the ability of AI to reach new forms of human capital accumulation through advancements that achieve or surpass human function, as its technological capability develops, will be a key determinant of productivity frontiers.

Applications and markets are a key conduit to AI-driven productivity as they capture the integration of AI across sectors and interoperability across sector-specific applications, degree of investment, market maturity and scale. AI applications tailored to specific sectors, such as health care, fintech, agriculture and manufacturing, optimize resource use and enhance productivity by addressing unique industry challenges. Vibrant corporate ecosystems, comprising big tech companies, start-ups and venture capital availability, are essential for fostering innovation and commercialization of AI solutions. Business adoption will have direct impacts on productivity metrics, especially when returns on private investments are seen and SMEs face low barriers to accessing AI technology.

Market maturity and scale established through start-up ecosystems and large consumer markets attract global talent and investment, paving the road for diverse AI applications to diffuse through the economy. IP payments and receipts will be a key determinant of a country's innovation — enabling the AI ecosystem through knowledge creation, diffusion and business sophistication — as noted in WIPO's Global Innovation Index as key innovation inputs and outputs. Further ecosystem integration, referring to cross-sector and cross-border collaboration of AI tools, will determine the distribution of AI-driven productivity impacts. Public engagement — the willingness of individuals to interact with and trust AI technology as consumers — will shape the adoption curve and how deeply AI permeates daily life and economic systems. Ultimately, the development and adoption of applications and markets will act as the bridge between technological innovation and measurable productivity advancements.

Finally, **policy and regulation** can steer AI-driven productivity by shaping the labour force and AI talent pool and the domestic regulatory environment and standards, and through international influence to shape broader ecosystems as well. Policies focused on labour markets and human capital, such as reskilling initiatives or AI study programs, will determine the breadth to which the workforce can smoothly adapt to AI-driven changes. Building a pool of AI experts and fostering a well-trained technical workforce are critical priorities, achieved through investments in STEM education, reskilling programs and policies encouraging the immigration of skilled professionals.

Domestic regulation and standards that balance innovation and safety are pivotal in supporting sustainable AI development. Government support and investment in infrastructure development through public-private partnerships (PPPs) will address the level of accessibility of AI across industries. A critical area for AI policy and regulation is data governance and standards. With data as a key driver for AI innovation, governments can ensure secure, safe and responsible AI through clear and enforceable legislation. Policies that promote healthy competition and cooperative global governance will help efficiently balance the distribution of AI benefits across economies. As well, government efforts to enhance public trust in AI can help speed its diffusion and consequent productivity impact. Government support through tax incentives will also play a critical role in enabling the growth of the AI industry, especially led by private entities. Favourable tax policies do not seek to replace regulatory guardrails but augment them by encouraging firms to internalize societal priorities into their investment calculus. For example, some of the initiatives governments could take are:

- **Capital allowances for AI tools:** Provide investment tax credits for AI systems that meet criteria for ethical AI use (for example, explainability, non-discrimination, safety testing), similar to how green technologies are incentivized.
- **Employment tax credits for inclusive AI deployment:** Offer hiring incentives to firms using AI to augment rather than replace jobs in vulnerable sectors, or those that invest in worker reskilling as part of automation strategies.
- **R&D tax incentives linked to public values:** Modify R&D tax credits to favour projects addressing public-interest AI use cases (for example, health diagnostics, sustainable agriculture or climate forecasting in order to better align private innovation with social priorities).
- **Use of tax deductions for AI certification:** Encourage firms to adopt responsible AI certification frameworks by making related audit and compliance costs tax-deductible.

On the international stage, active participation in AI alliances and leadership in global standard setting allow governments to shape norms that ensure compatibility and competitiveness in global markets. Effective policy and regulation are the essential enablers that align AI's disruptive potential to long-term productivity growth and societal well-being.

Country-level Assessment Using Methodology to Identify AI-Driven Productivity

By assessing the interdependent variables of the core transmission conduits for leveraging AI for its productivity potential, country capabilities, strengths and gaps can be sketched out. This assessment provides a road map for leveraging AI to steer productivity gains on a country-specific basis.

In an ideal world, nations would aim to invest across all key variables of the AI ecosystem, recognizing the interconnected nature of each component. For example, countries with vast resources and global influence may look to ensure end-to-end control of the AI value chain, from foundational infrastructure to applications and global standard setting. To compete globally, leadership in both foundational inputs and ethical frameworks can ensure a country's AI solutions are globally trusted and adopted. The productivity benefits of AI compound: investments in multiple channels amplify the overall impact. Strong foundational infrastructure enhances research, which in turn feeds into scalable platforms and industry applications.

However, achieving excellence through each channel requires significant resources and advanced governance structures. For most countries with constrained resources, focusing on specific channels where they hold strategic advantages may yield faster and sustainable returns. Thus, comparative advantage plays a crucial role in determining a nation's ability to foster AI-driven productivity.

Canada is relatively well-positioned in the global AI landscape, with strengths concentrated in technology and policy frameworks. The country benefits from robust data infrastructure (Deloitte, n.d.), backed by strong data governance and R&D capabilities, supported by world-class research institutions such as Mila and a highly active academic community. Additionally, Canada's focus on tools and infrastructure has fostered emerging platforms for niche AI applications, especially in sectors such as fintech. However, challenges persist in scaling these innovations due to gaps in compute capabilities as Canada lacks domestic semiconductor fabrication capabilities (Joshi 2015). Similarly, the investment ecosystem remains limited (May 2024), with a small domestic market scale and constrained diversity in AI applications compared to global leaders. On the policy front, while domestic standards are inclusive, Canada's labour pool heavily relies on immigration (Hardy 2023), with limited focus on cultivating a domestic talent pipeline, and leadership on the international level is relatively underdeveloped. Addressing these gaps could enable Canada to leverage its existing strengths for significant productivity gains, particularly in niche AI sectors and global collaborations.

France exhibits considerable strength in AI capabilities, particularly in R&D, driven by institutions such as the National Institute for Research in Digital Science and Technology (Technavio 2024) and its leadership in Industry 4.0 initiatives (European Commission 2017). It is supported by EU-backed data governance frameworks and has expertise in industrial automation and smart mobility. Additionally, France excels in sector-specific AI applications, leveraging its strong industrial base to implement AI solutions in manufacturing and logistics (Technavio 2024). On the policy front, domestic standards, anchored by advanced General Data Protection Regulation (GDPR) frameworks (Government of France 2020), and active international leadership in EU dialogue on AI ethics, underscore France's robust regulatory environment. However, challenges remain, as the country lacks a domestic semiconductor industry (Abachy.com 2023), limited private venture capital in its domestic industry exists and dependence on EU support constrains the scalability of start-ups. Furthermore, labour gaps, with a shortage of AI and data-intensive talent, limit France's ability to fully capitalize on its AI strengths (Cedefop 2016).

Germany stands out in the global AI landscape due to its strong foundation in industrial applications and automation.[5] Its leadership in R&D is evident through its significant role in Industry 4.0 initiatives (Tuan 2023), supported by robust data infrastructure tailored to industrial data capabilities. Additionally, Germany excels in AI software, tools and infrastructure, particularly in robotics-focused platforms, making it a global leader in sector-specific AI applications such as automotive and manufacturing (OECD 2024c). The country's strong industrial base underpins its investments, fostering innovation and technological growth. On the policy front, Germany benefits from strong domestic standards through GDPR compliance and in international standards setting, with its active participation in shaping EU-led AI ethics and safety standards. However, notable challenges exist as Germany lacks domestic semiconductor manufacturing capabilities (Radnik, n.d.), and AI adoption is a challenge compared to global leaders due to the country's limited consumer market size. Furthermore, labour constraints, driven by a shortage of advanced AI-skilled talent and an aging population, pose risks to long-term competitiveness (OECD 2024c).

Italy's AI capabilities are anchored in its strengths in R&D, particularly in robotics and automation, and data infrastructure, supported by its participation in EU-backed data governance projects (HowToRobot 2023). These strengths enable Italy to excel in sector-specific AI applications, with a focus on industrial automation, leveraging its strong industrial base for innovation. Additionally, Italy benefits from domestic standards, aligning closely with GDPR and EU frameworks, ensuring robust data protection and ethical governance. However, Italy faces significant gaps: it lacks domestic semiconductor manufacturing capabilities (Bortolazzi and Verrocchio 2024) and has very limited software development capabilities. Challenges in attracting capital is another major issue, with heavy reliance on EU-backed funding and a lack of private sector venture capital, and with a limited consumer base, adoption challenges exist, further constraining scalability (European Commission 2024). Furthermore,

5 See www.trade.gov/market-intelligence/germany-ai-manufacturing.

labour shortages,[6] coupled with an aging workforce, and limited leadership in international standards setting inside the European Union and on the global level, restrict Italy's ability to compete globally.

Japan's AI capabilities are anchored in its leadership in hardware and compute ecosystem, supported by a robust semiconductor industry, and R&D, with a strong focus on robotics and industrial AI innovation (Ulpa 2024). Its advanced data and internet infrastructure provides a solid foundation for AI adoption. Japan excels in sector-specific AI application development, particularly in robotics and industrial automation (ibid.), and benefits from market scale, with a strong domestic market for testing and deploying AI solutions. Furthermore, Japan's disciplined regulatory frameworks and active participation in international standards setting highlight its commitment to ethical AI governance and global collaboration. However, Japan faces challenges with its software industry, where its domestic ecosystem is underdeveloped and reliant on international platforms (News on Japan 2024). Additionally, investments in venture capital remain relatively low compared to global peers (Kim and Truitt 2023) due to an economy constantly battling deflationary pressures, limiting the scalability of AI-driven start-ups (Patel 2024). Labour constraints, such as difficulties in attracting global AI talent and an aging workforce, also hinder long-term competitiveness.

The **United Kingdom** demonstrates significant strengths in AI capabilities, particularly in data infrastructure with advanced broadband networks (Vincent 2025; GOV.UK 2025), and R&D, supported by top-tier institutions such as the University of Oxford, the University of Cambridge and Imperial College London. Its robust technological infrastructure capability contributes to a thriving fintech sector, positioning the United Kingdom as a leader in specific sectors such as fintech (Warren 2023). Additionally, its strong domestic ethical AI frameworks underscore its commitment to responsible innovation. However, the United Kingdom faces severe gaps, with a limited domestic semiconductor industry (Milmo and Mason 2023) and investments concentrated on public sector capital funding for AI start-ups (techUK 2025). Furthermore, labour constraints,[7] including reliance on immigration for STEM talent and limited focus on domestic pipeline development, as well as lack of leadership in shaping global standards on AI, hinder its global competitiveness.

The **United States** demonstrates significant leadership in AI capabilities across all conduits, particularly in technology, applications and policy frameworks (Nguyen 2024), with world-class broadband infrastructure, diverse data sets and leading universities fostering advanced AI research (Open Data Science 2024). The vibrant start-up ecosystem and strong venture capital presence have propelled sector-specific AI applications in areas such as health care, finance and defence, making them critical drivers of productivity growth (PYMNTS 2024). Additionally, the country's ethical AI initiatives and leadership in global AI alliances enhance its ability to set international standards and maintain technological dominance. However, gaps such as limited domestic semiconductor manufacturing, and challenges in scaling a domestic STEM workforce, could hinder its long-term competitiveness (Huang and Arnold 2020). Overall, the United States' robust AI ecosystem has the potential to drive substantial productivity gains across industries while maintaining its position as a global AI leader.

China demonstrates unparalleled strength in AI capabilities, particularly in data infrastructure, with access to massive data sets and robust government-led AI policies, and hardware and compute ecosystem, supported by a strong domestic semiconductor industry (Na and Zhu 2025). Its R&D benefits from significant public-private funding (Xinhua News Agency 2023), driving advancements in cutting-edge AI technologies. These capabilities fuel China's leadership in sector-specific AI applications, particularly in fintech, e-commerce and defence, while it can leverage a massive consumer and industrial base for rapid AI adoption (Shen et al. 2022). Additionally, China's labour and talent pool is reinforced by a strong STEM workforce, and comprehensive internal regulatory frameworks. However, China's AI software, tools and infrastructure face challenges related to global trust issues with Chinese AI platforms, limiting international scalability (McKenna 2025; Digital Desk 2020). Furthermore, limited participation in international standards setting reflects geopolitical barriers to global engagement, constraining China's ability to influence international AI norms and governance.

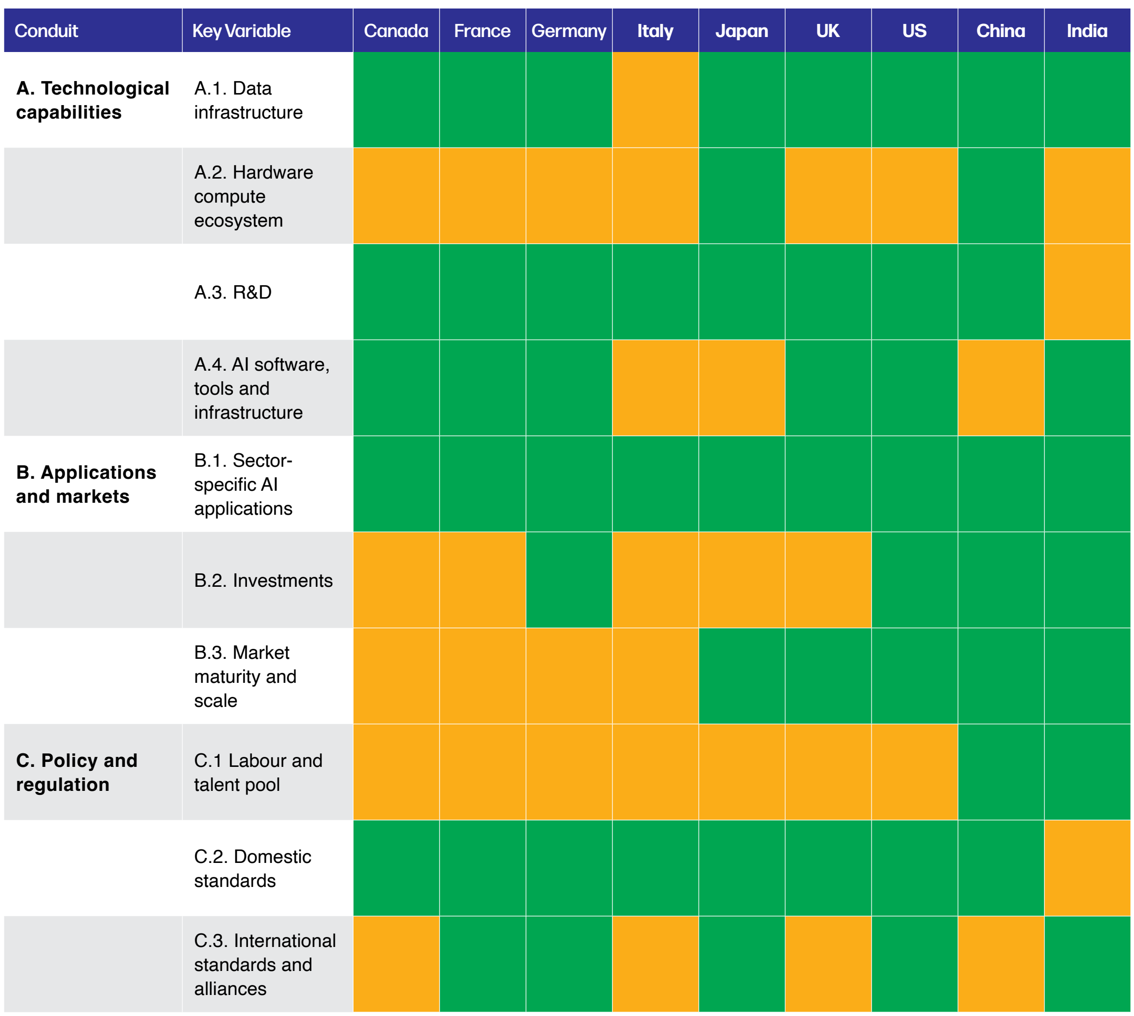
6 See www.interface-eu.org/focus-area/ai-labour-markets.

7 See https://x0pa.com/blog/why-uk-tech-skill-shortage-is-at-its-highest/.

India exhibits strong AI capabilities, particularly in data infrastructure, leveraging massive data sets and digital connectivity, and AI software, tools and infrastructure, with significant advancements under the India Stack initiative (ETtech 2024). These strengths enable India to excel in developing sector-specific AI applications, with substantial growth in fintech, health care and educational technology sectors, supported by a strong investments ecosystem that benefits from a vibrant start-up environment and increasing foreign direct investment (FDI) and foreign institutional investor (FII) inflows.[8] Fuelled by its large population and rapidly expanding digital economy, India provides a significant advantage for both consumer and industrial AI applications (Nayak 2024). Additionally, India's labour and talent pool is bolstered by a strong pipeline of STEM professionals, positioning it as a leader in emerging markets (Nasscom Insights 2023). However, India faces challenges in R&D, with nascent domestic capabilities for foundational AI research, and currently it lacks a domestic semiconductor manufacturing base (Bhandari 2023). Furthermore, domestic standards and regulations remain underdeveloped, limiting the establishment of robust AI governance frameworks (Mohanty and Sahu 2024). Despite these gaps, India's rapid adoption of AI across sectors and its leadership role in global forums such as the G20 and BRICS+[9] indicate a high potential for AI-driven productivity gains (Schwab 2024).

Figure 6 summarizes where each country has an overall strength or gap in the key variables that convey AI-driven productivity.

Figure 6: G7 Countries, China and India — AI Comparative Advantage Heat Map



Source: Authors.
Note: Green indicates a strength and yellow indicates a gap.

8 See www.statista.com/statistics/882293/india-startup-deals-value/.

9 The BRICS group now includes 11 countries: Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Indonesia, Iran, Saudi Arabia and the United Arab Emirates (UAE).

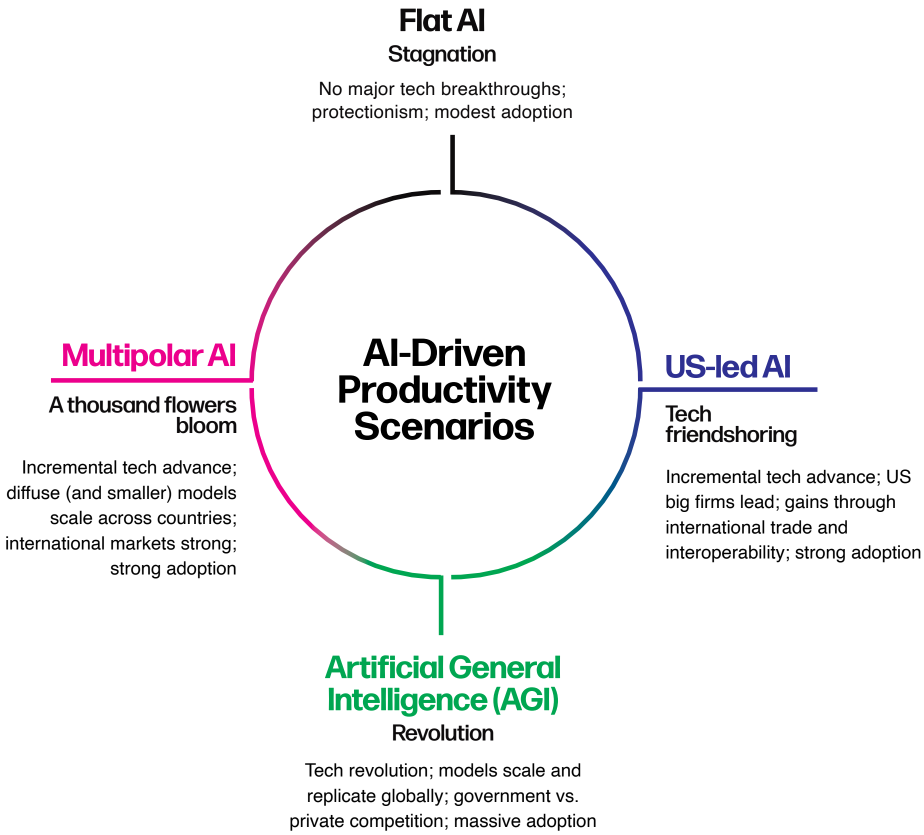
AI-Driven Productivity Scenarios for the G7

The complexities and uncertainties inherent in the evolution of AI make definitive predictions on its evolution highly speculative. Nevertheless, policy makers — including central banks and finance ministries — must prepare for this uncertain future. This section explores potential futures by outlining four distinct scenarios for the potential impact of AI on global productivity. These scenarios span a broad spectrum of possibilities and are not intended to be viewed through either a pessimistic or optimistic lens. Many different scenarios could be developed as there are many variables. In addition, surprises or even black swan events should be assumed over the medium term, which could slow down, accelerate or reset any scenario.

Nations looking to steer productivity gains through AI must consider how to leverage their strengths, address gaps or opportunities, and navigate evolving geopolitics. The dynamics of AI advancement and country-level analysis above allow the authors to propose four plausible scenarios of AI-driven productivity. A strong research and infrastructure base, albeit with limitations in critical components such as semiconductors, informs a possible future where flat AI prevails — advancements would be slow, concentrated in a few large firms, and productivity gains would be limited due to non-interoperable ecosystems and protectionism. A projection of the US-dominated tech ecosystem, with strategic investments and talent inflow, postulates a US-led scenario where gains are heavily concentrated in the United States, with some significant linkage and spillover to allies. Diverse capabilities in various regions, with differing AI ecosystems and domestically tailored purpose, and potentially with lower-cost models, would lead to multipolar AI, where different global powers develop leadership and productivity benefits are more diffused. The technology of AI itself progresses to achieve breakthrough advances toward AGI and ushers in a scenario that radically transforms global productivity, society and labour markets.

It is important to note that these scenarios are not mutually exclusive. They may unfold concurrently, shaped by overlapping and compounding conditions. This special report is designed to stimulate critical thinking and informed discussion, and to help provide policy makers with the foresight necessary to navigate an increasingly uncertain and complex future. Figure 7 summarizes the four scenarios of AI-driven productivity at a high level.

Figure 7: AI-Driven Productivity Scenarios



Source: Authors.

Scenario 1: Flat AI – Stagnation

This scenario assumes that AI dynamics and outcomes lead to stagnation with suboptimal productivity gains, primarily benefiting a small set of firms, particularly in the United States. The productivity gap between AI-intensive and non-AI-intensive sectors widens, limiting overall economic impact. The United States maintains existing leadership but achieves only minimal gains due to protectionist policies — it is unable to realize gains in areas where it does not have a comparative advantage. Consequently, other nations, including the rest of the G7, do not progress significantly either. Through heavy tariffs and export controls on critical infrastructure and resources, the United States looks to limit China's growth but with minimal impact. Most wealth benefits are highly concentrated among large companies in the United States and China. The lack of widespread adoption or global integration exacerbates global inequality, limiting access to AI-driven development opportunities for developing economies or lower-income populations.

How did we get there? In this scenario, G7 nations increasingly seek to prioritize strategic AI and data sovereignty, a move that significantly impacts the trajectory of AI development. This approach manifests in the imposition of stringent public sector guidelines on private sector innovation, primarily driven by national security imperatives. Such control mechanisms are rooted in a zero-sum logic, fostering a climate of suspicion regarding technological capabilities of the other member states. This, in turn, disrupts the potential for formal G7 cooperation, hindering collaborative efforts and impeding the realization of shared benefits.

Technological capabilities: There are no major technological breakthroughs, only patchy progress on existing generative AI and other applications, and incremental improvements in automation and analytics.

Applications and markets: General protectionist and competitive behaviour dominate inter-state dynamics, including significant export controls on key components such as high-end chips. Applications and markets continue to develop, but at a much-reduced pace compared with a more open system. There is slow diffusion across industries, and adoption remains concentrated among large firms and advanced tech sectors, with weak spillover to SMEs and traditional sectors. The economic impact is uneven, exacerbating existing productivity disparities.

Policy and regulation: Reactive government policies fail to keep pace with technological change, and weak or no policy frameworks are implemented. There are limited investments in AI infrastructure, workforce retraining, tax credits for SMEs and PPPs. There is no significant advancement on international policies, standards or regulations to facilitate cooperation, broader benefit sharing (for example, technology transfer) or to establish guardrails to manage safety concerns (for example, deepfakes, cyberattacks and autonomous weapons). AI ecosystems across China, the European Union, India, the United States and elsewhere do not build strong interoperability or integrated markets.

Scenario 2: US-led AI — Tech Friendshoring

This scenario assumes that AI productivity gains are significant but largely concentrated in the United States and its trade allies, assuming the United States is open to international tech trade. The United States dominates AI innovation and commercialization, setting global standards. The United States leverages its technological edge to secure economic and security advantages, reinforcing its primacy in AI-driven industries. This leadership comes with strict control over AI supply chains, limiting access to cutting-edge models and chips for strategic competitors, particularly China and some other developing economies. Productivity gains are uneven, with US trade allies benefiting from access to US-led AI ecosystems, with many others facing restrictions. While disparities remain between countries with strong conduits and those without, a partially more open system allows for greater diffusion of AI-driven productivity gains globally.

How did we get there? This scenario envisions the United States assuming a leadership role in diffusing the benefits of AI-driven productivity gains among like-minded nations. This involves the US public sector actively fostering formalized partnerships with other G7 members, thereby facilitating private sector cooperation and collaboration within the group. Recognizing the need for a structured framework, G7 nations concurrently seek to develop institutional and governance structures to support and deepen this integrated approach, aiming to maximize the collective benefits of AI-led progress while ensuring responsible development and deployment.

Technological capabilities: There are incremental technological advancements driven by large existing US AI companies such as OpenAI, Anthropic, Google, Meta and X AI. Technological advancement is dependent on massive investment requirements given an assumed high level of required compute/chips. The recent proposal “AI in America: OpenAI’s Economic Blueprint” outlines a strategy for massive infrastructure and other investments in the United States, and proposes roles for like-minded countries, most around common security standards (OpenAI 2025). The United States sustains a clear lead in AI research, with significant advancements in foundation models, automation and robotics. These gains are locked within US-led ecosystems, creating a technological moat that others struggle to cross.

Applications and markets: The United States leads in strategic PPPs that drive R&D and deployment. AI deployment accelerates across key industries, including finance, health care and defence. The private sector drives much of the adoption, supported by targeted government subsidies and regulatory support. AI supply chains become increasingly bifurcated, with US-aligned markets integrating more closely while non-aligned countries struggle with limited AI diffusion. SMEs in the United States benefit from cloud-based AI tools, but developing economies face increasing barriers to access, reinforcing global inequality.

Policy and regulation: Significant investments in AI education, reskilling and infrastructure, such as the recently announced US$500 billion “Stargate” US government venture with several US companies to strengthen their AI leadership (Jacobs 2025). Through cooperation and leadership, the United States fosters strategic partnerships enabling broader access to and cross-border flows of AI technologies and infrastructure. US-China rivalry remains high. There is overall US resistance to global standards or constrained policy and regulatory space on AI data governance. G7 coordination is limited with a focus on data and cybersecurity. Concrete friendshoring is limited.

Scenario 3: Multipolar AI — A Thousand Flowers Bloom

This scenario assumes that productivity gains are significant and more evenly distributed, as various regions develop their own AI capabilities, creating a multipolar AI order. Multiple countries, including the BRICS+, drive technological developments through innovation, creating more geographically diverse AI-innovation hubs to play in the league alongside large US and Chinese tech companies. Competitors emerge to the US free-market innovation model, such as a Chinese industrial model, an Indian cost-efficiency (labour) model and an EU ethical (regulatory) focus. While tensions remain, economic pragmatism drives partial cooperation on key AI standards and safety regulations. Global economic imbalances persist, but AI diffusion is broad enough to support widespread adoption across industries and SMEs. SMEs are able to compete at the global level, as potentially demonstrated by the recent release of a very cost-efficient LLM model and app from the Chinese company DeepSeek. If true, this is a game-changer for all smaller economies in the G7 and for many emerging economies.

How did we get there? Recognizing the transformative potential of AI, major and emerging powers, including India and China, actively seek to develop their own AI industries and make breakthroughs on models and scaling. Each nation strategically leverages its existing industrial, technological and socio-economic strengths to gain a competitive edge, aligning AI development with its broader ideological vision. This pursuit of strategic advantage, coupled with the recognition of AI’s profound security implications, also leads to a complex interplay of competition and cooperation. While nations primarily focus on their own national interests, they also acknowledge the need for engagement on critical issues such as cybersecurity, leading to limited areas of shared benefit amid a broader landscape of strategic competition.

Technological capabilities: There is a further boost in the intangibles economy, with IP as driver of value creation. Significant opportunities exist for companies with strong intangible assets, and those leveraging AI in high-exposure sectors such as health care and advanced manufacturing.

Applications and markets: China, the European Union, India and other actors make significant progress in AI applications, ensuring a more decentralized innovation landscape. Investment could spread across G20 countries and some smaller innovators (for example, Singapore and the UAE). There is significant potential for investments in regional AI infrastructure and PPPs.

Policy and regulation: Collaborative frameworks for global data governance and interoperability emerge, as well as tailored national policies to meet local needs and foster inclusive growth. A more distributed AI innovation landscape allows for regional hubs to emerge, fostering broader wealth distribution across advanced and emerging economies. There are diverse pathways for AI-driven economic growth to create opportunities for small open economies and SMEs. Access for the poorest countries is still low and requires support. There are many potential implications for international cooperation. This creates a logic for a strong level of regional activity such as the Association of Southeast Asian Nations (ASEAN) Digital Economic Framework Agreement for AI, which seeks to harmonize opportunities in the region (ASEAN 2023). Another example could take the form of new agreements between like-minded groups such as the Five Eyes to further coordinate on security matters relating to AI and its use. The BRICS+ explore some form of AI technology-sharing framework that focuses on the development aspects of AI for developing economies. At the same time, US-China rivalry shifts to focus on military applications of AI tech hardware. Given AI dual-use capabilities, commercial interests and security interests are intertwined.

Scenario 4: AGI – Revolution

This scenario assumes that the technological advancements in AI reach a level of AGI, leading to a radical restructuring of economic structures, labour markets and global productivity. AGI-driven automation and problem-solving capabilities unlock innovation and unprecedented productivity gains, reshaping industries. The world undergoes a rapid transition as economies either adapt to AGI's transformative effects or struggle with disruption. Some countries embrace AGI-driven economic benefits, while others face significant challenges due to rapid job displacement and rigid governance systems.

How did we get there? The breakthrough to AGI becomes possible by a convergence of technical advances that accelerated progress. Key steps included the scaling of multimodal foundation models capable of reasoning across text, vision and action spaces and the integration of symbolic reasoning with deep learning to enable generalized problem solving. A number of countries funded compute infrastructures and open science protocols that fuelled both competition and some sharing of tech advances. What followed was a rapid transition to AI agents capable of abstract reasoning, self-improvement and cross-domain adaptability — crossing the AGI threshold. The AGI breakthrough does not guarantee common global regulation standards or the fair distribution of benefits across and with countries.

Technological capabilities: The widespread deployment of AGI fundamentally reshapes the global economy, shifting value creation from specialized AI applications to autonomous, self-improving systems capable of performing a broad range of cognitive-type tasks. The intangibles economy expands exponentially, including autonomous scientific discovery, complex decision making, and real-time optimization in sectors such as medicine, materials science and finance. Competitive advantage shifts toward entities with access to the most advanced AGI systems and the most valuable data sets. Rapid scaling creates a bifurcation between firms and nations with AGI leadership and those relegated to dependency.

Applications and markets: AGI could fulfill many scalable production functions and tasks, freeing up human labour for other purposes. While in some cases AGI replaces human labour, in others it is an augmentation, such as through semi-autonomous laboratories working 24/7 and leveraging network effects across multiple knowledge centres. Progress in solving for complex global challenges is potentially moved forward (for example, climate change, biomedical research). Systemic transformation of industries with widespread automation of complex decision making occurs. Large-scale investments in infrastructure and labour retraining (for example, prompt engineers) take place. Traditional productivity metrics, such as output per hour and revenue per employee, become outdated due to fundamental economic restructuring and selective decoupling of human labour and AI-driven economic output. New measures of capital productivity, AI-driven innovation and the value of intangibles are needed as well as new formulations of the Human Development Index and other social well-being indicators.

Policy and regulation: With AGI automating complex tasks, wealth may concentrate among those who own AI systems, data and infrastructure, rather than traditional wage earners. Some economies implement large-scale adaptation strategies, including universal basic income and workforce retraining, while others struggle with the pace of change. If policies ensure inclusive deployment, wealth creation would be more widespread, raising living standards benefiting both advanced and emerging economies. However, without a robust governance or cooperation framework, AGI benefits would remain highly concentrated among technology owners, exacerbating inequality on a global scale. International governance mechanisms could address broad ethical, safety and geopolitical issues with a focus on inclusive deployment of AGI and avoidance of overly concentrated benefits at both national and international levels. Revolutionary AGI increases the prospects for international cooperation because it brings new opportunities. If cooperation is not achievable globally, like-minded groups such as the G7 would have a strong incentive to cooperate more closely as a group on security issues, including data sovereignty and military controls. The role of large technology companies would also be a core issue given their likely size in leading technologies.

Figure 8 provides a summary of the projected trends across this special report's three core conduits and corresponding productivity gains. Each conduit is impacted in different ways under each scenario, with varied estimated impacts on productivity.

Figure 8: Summary of Projected Trends, Productivity Impact and Distribution Across Scenarios for the G7

AI-Driven Productivity Scenarios	Projected Trend of Core Transmission Conduits			Productivity – G7 Impact and Distribution
	Technological Capabilities	Applications and Markets	Policy and Regulation	
Flat AI — stagnation	→	↘	↘	- Suboptimal - Narrow gains
US-led AI — tech friendshoring	↗	↗	→	- Significant - Skewed to US and allies
Multipolar AI — a thousand flowers bloom	↗	↗	↗	- Significant - Benefits diffused relatively evenly
AGI — revolution	⇗	⇗	↗	- Very significant - Global benefits, but gaps and inequality remain

Source: Authors.

Key Takeaways

Given recent rapid technological advances in AI and weak economic growth projections as critical context, this special report makes the case for a focus on AI as a potential key driver to increase productivity within and across G7 countries — and beyond.

Recognizing the data limitations of accurately measuring and projecting productivity, three conduits were selected and used to assess current and potential productivity pathways across the G7 countries. A detailed analysis for each country is included in Appendix 2 and provides a basis for consideration by each country. Broadly, the most significant weakness for the G7 countries is expected to be ensuring the required labour and talent pool is in place, which relies heavily on immigration, attraction and retention. In addition, limitations in market scaling and access to large pools of private capital may also be limiting factors on the horizon outside of the United States.

The range and uncertainties in the four scenarios outlined, each with different impacts on the productivity frontier, offer a broader scope for the consideration of strategies and options among G7 countries. Overall, the scenarios provide a rationale for exploring greater G7 coordination as a way to both increase productivity in their own countries and boost productivity at the international level.

Effectively translating AI policy actions into real-world impact will require the G7 to consider a range of actions.

Agreement among G7 member states on common objectives — such as improving AI research capacity or establishing cross-border data-sharing protocols — and working together to ensure these objectives remain at the forefront of domestic agendas. To prevent initiatives from becoming scattershot or lost amid shifting political priorities, the G7 could seek to assign specific tasks to existing institutions. A unified approach — such as designating a G7 AI Task Force — bolsters accountability and encourages members to coordinate rather than duplicate efforts.

If the G7 is to harness AI's full potential to increase productivity, budgetary commitments and programs need to reflect the scope and complexity of this technological shift. Governments might set aside new allocations or reallocate existing funds, focusing on research labs, infrastructure and support programs for SMEs, since these are the heart of growth and innovation in many G7 economies and cannot rely on venture capital investment to grow or scale. Government has a clear relationship with all firms through the tax system, and most G7 countries have existing programs for demand-side subsidies in the form of tax credits to support scientific research and experimental development for SMEs. In other cases, PPPs offer an efficient route to channel both public funding and private capital into AI initiatives. By engaging corporate investors and venture capital, the G7 can attract expertise, scale resources and expedite the commercialization of new research. This blend of governmental support and market-driven innovation ensures that AI is both cutting-edge and sustainable.

Even with sufficient funding and political backing, regulatory and legal frameworks are essential for AI policies to succeed across borders. Harmonized standards — on data privacy, export controls and IP rights — would allow AI-driven products and services to flow more seamlessly, reducing friction for developers and consumers alike across the G7 nations. At the same time, governments will want to adopt agile national policy tools that can evolve with emerging AI technologies, including advanced applications such as AGI.

Effective implementation also hinges on governance — how AI initiatives are monitored and managed. By establishing (or repurposing) transparent accountability structures, such as a G7 AI Council, member countries could evaluate progress, address challenges promptly and consistently share best practices. This oversight body would track policy milestones, ensuring that any unexpected hurdles — technical, financial or political — receive prompt attention. Equally important is stakeholder engagement. Civil society, academic experts and private-sector innovators bring fresh perspectives and valuable feedback; their insights not only enrich policy planning but also foster public trust. Involving these groups from the outset will help shape initiatives that are inclusive, and more likely to succeed.

Finally, geopolitics will continue to shape supply chains, investment flows and international relations, all of which can either facilitate or constrain AI adoption. Allied cooperation with non-G7 partners will broaden the potential market for AI tools, harmonize ethical guidelines and foster diverse knowledge exchange. Additionally, member countries should carefully manage strategic autonomy, ensuring they are resilient against geopolitical uncertainties. For instance, safeguarding semiconductor supply chains could prevent bottlenecks in AI hardware, a critical consideration if international tensions disrupt cross-border trade. In the same respect, there is a common interest in the need for continuous improvement on AI data security and integrity in the face of cyber and other attacks.

Considering a multifaceted approach toward implementing the policy prescriptions set out in this special report could allow the G7 to lay a stable foundation to tackle the challenges of today, be prepared for the next generation of AI developments and extract the maximum productivity benefits from AI, driving inclusive economic growth while maintaining their collective leadership in shaping the future of global innovation.

Appendix 1: Analysis of AI-Related Indices

As described in this special report's framing section, the authors' approach to exploring AI-driven productivity scenarios for the G7 was established by identifying key conduits through which AI will impact national productivity frontiers through an analysis of four established AI-related indices: the Stanford Global AI Vibrancy Tool, the Oxford Insights Government AI Readiness Index, the IMF AI Preparedness Index and the WIPO Global Innovation Index. In the table below, the key conduits, their components and specific descriptors/indicators used in the approach are outlined, drawn from some of the indicators of each index.

Table A1: AI-Related Indices – Conduit to Indicator

Conduits	Variables	Descriptors/Indicators
Technological capabilities	Data infrastructure	Availability of high-quality, diverse data sets; robust broadband penetration; data centres and cloud infrastructure; comprehensive data governance frameworks and accessibility, open data initiatives and policies.
	Hardware and compute ecosystem	Design and fabrication of semiconductors, GPUs, TPUs and advanced technologies; compute capacity; supply chain resilience; advancements in semiconductor technology nodes, supercomputers, broadband and fifth-generation (5G) infrastructure, affordability and costs of compute resources, data acquisition, infrastructure development.
	R&D	High-calibre academic institutions and research centres; investments in AI publications, patents and Ph.D. graduates; public and private sector funding for foundational research.
	AI software tools, platforms and infrastructure	Development of transformative architectures (e.g., transformers, diffusion models); open-source frameworks; standardized tool kits that enable broad adoption. Cloud service providers and specialized platforms (e.g., MLOps, AutoML); integration with global AI ecosystems for scalability and collaboration; middleware solutions, APIs and libraries that integrate AI models into enterprise workflows; bridging research and real-world applications to enhance productivity.
Applications and markets	Sector-specific applications	AI applications tailored to sectors such as health care, fintech, agriculture and manufacturing; optimizing resource use and enhancing productivity.
	Investments	Vibrant corporate ecosystems with big tech companies, start-ups and venture capital availability; private AI investment; supportive regulatory environments enabling commercialization.
	Market maturity and scale	Mature start-up ecosystems; large consumer markets that attract global talent and investment; providing a testing ground for AI applications, market valuation of leading AI firms, IP payments and receipts.
Policy and regulation	Labour and talent pool	Robust pipeline of AI experts; well-trained technical workforce; policies encouraging immigration of skilled professionals; investments in STEM education.
	Domestic regulation and standards	National AI strategies, public procurement of AI tools, clear governance frameworks encouraging innovation while ensuring ethical AI use; transparent compliance mechanisms to foster trust among businesses and consumers, citizen trust in AI, competition policy, data governance and responsible AI.
	International influence	Participation in international AI alliances; leadership in global standard setting; shaping norms to ensure compatibility and competitiveness in global markets, open standards for interoperability between systems, cross-border flow and trade of AI products and services.

Source: Authors.

Appendix 2: Country Profiles

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Robust broadband penetration **A.3. R&D:** World-class research centres (such as the Canadian Institute for Advanced Research, Mila and the Vector Institute), strong academic output **A.4. AI software, tools and infrastructure:** Availability of cloud service providers	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor fabrication
	B. Applications and markets	**B.1. Sector-specific AI applications:** Fintech	**B.2. Investments:** Limited domestic private sector venture capital **B.3. Market maturity:** Small market scale compared to peers, limited diversity in applications
	C. Policy and regulation	**C.2. Domestic standards:** Inclusive regulatory policies	**C.1. Labour:** Dependence on immigration for STEM workforce, limited focus on domestic pipeline development **C.3. International standards:** Limited leadership in shaping global norms

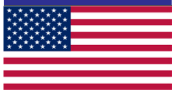
Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** EU-backed data governance **A.3. R&D:** INRIA, strong AI networks **A.4. AI software, tools and infrastructure:** Specialized platforms, industrial automation	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor development
	B. Applications and markets	**B.1. Sector-specific AI applications:** Industrial AI	**B.2. Investments:** Limited domestic private sector venture capital and limited EU support **B.3. Market scale:** Limited market scale for consumer AI
	C. Policy and regulation	**C.2. Domestic standards:** Advanced GDPR privacy frameworks **C.3. International standards:** EU leadership in AI ethics and safety standards	**C.1. Labour:** Talent scarcity in AI and data-intensive fields

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Strong data centres and cloud infrastructure **A.3. R&D:** Industry 4.0 leadership **A.4. AI software, tools and infrastructure:** Specialized platforms (robotics-focused platforms)	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor capability
	B. Applications and markets	**B.1. Sector-specific AI applications:** Robotics, automotive **B.2. Investments:** Strong industrial base	**B.3. Market scale:** Limited market scale for consumer AI
	C. Policy and regulation	**C.2. Domestic standards:** Advanced GDPR privacy frameworks **C.3. International standards:** EU leadership in AI ethics and safety standards	**C.1. Labour:** Shortage of advanced AI-skilled talent and aging population

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.3. R&D:** Specialized platforms (robotics and automation)	**A.1. Data infrastructure:** Robust broadband penetration **A.2. Hardware and compute ecosystem:** Limited domestic semiconductor capability **A.4. AI software, tools and infrastructure:** Limited development
	B. Applications and markets	**B.1. Sector-specific AI applications:** Industrial automation	**B.2. Investments:** Limited domestic private sector capital market development and reliance on EU-backed investments **B.3. Market scale:** Limited market scale for consumer AI
	C. Policy and regulation	**C.2. Domestic standards:** Aligned with European Union's GDPR framework	**C.1. Labour:** Shortage of advanced AI-skilled talent and aging population **C.3. International standards:** Limited to conversations within EU framework

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Advanced broadband, data centres and cloud infrastructure; comprehensive data governance framework **A.2. Hardware and compute ecosystem:** Semiconductor leadership **A.3. R&D:** Specialized platforms (robotics)	**A.4. AI software and tools:** Limited domestic capability and dependence on international ecosystems
	B. Applications and markets	**B.1. Sector-specific AI applications:** Robotics, industrial AI **B.3. Market scale:** Strong domestic consumer market	**B.2. Investments:** Relatively low venture capital investment compared to peers
	C. Policy and regulation	**C.2. Domestic standards:** Sophisticated regulatory frameworks **C.3. International standards:** Active in global AI governance	**C.1. Labour:** Challenges in attracting global AI-skilled talent and aging population

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Advanced broadband networks **A.3. R&D:** Oxford, Cambridge, imperial leadership in AI ethics **A.4. AI software, tools and infrastructure:** Availability of cloud service providers and specialized platforms	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor ecosystem
	B. Applications and markets	**B.1. Sector-specific AI applications:** Fintech **B.3. Market scale:** Mature market and global hub for innovation	**B.2. Investments:** Limited domestic private sector venture capital
	C. Policy and regulation	**C.2. Domestic standards:** Strong ethical AI frameworks	**C.1. Labour:** Dependence on immigration for STEM workforce, limited focus on domestic pipeline development **C.3. International standards:** Lacks global leadership and partnerships

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** World-class broadband, diverse data sets **A.3. R&D:** Leading universities, transformative architectures **A.4. AI software, tools and infrastructure:** Cloud services, AI frameworks	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor manufacturing
	B. Applications and markets	**B.1. Sector-specific AI applications:** Health care, finance, defence, etc. **B.2. Investments:** Strong venture capital and private equity, vibrant start-up ecosystem **B.3. Market scale:** Large domestic consumer market	N.A.
	C. Policy and regulation	**C.2. Domestic standards:** Ethical AI initiatives **C.3. International standards:** Leadership in AI alliances	**C.1. Labour:** Dependence on immigration for STEM workforce, limited focus on domestic pipeline development

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Massive data sets, government-led AI policies **A.2. Hardware and compute ecosystem:** Strong semiconductor ecosystem **A.3. R&D:** Foundational research; development of transformative architectures, open-source frameworks and standardized tool kits	**A.4. AI software, tools and infrastructure:** Global trust issues with Chinese AI platforms
	B. Applications and markets	**B.1. Sector-specific AI applications:** Fintech, e-commerce, defence, etc. **B.2. Investments:** Government-backed investments in AI **B.3. Market scale:** Large domestic consumer market	N.A.
	C. Policy and regulation	**C.1. Labour and talent pool:** Strong STEM talent **C.2. Domestic standards:** Strong internal frameworks	**C.3. International standards:** Geopolitical barriers to global engagement

Country	Conduits	Key Variables (Strengths)	Key Variables (Gaps)
	A. Technology	**A.1. Data infrastructure:** Massive data sets and heavy investment into data centres and cloud infrastructure **A.4. AI software, tools and infrastructure:** Strong digital tools and development under India Stack	**A.2. Hardware and compute ecosystem:** Limited domestic semiconductor capability **A.3. R&D:** Nascent domestic capabilities
	B. Applications and markets	**B.1. Sector-specific AI applications:** Fintech, health care, edtech, etc. **B.2. Investments:** Vibrant start-up ecosystem and FDI/FII investment **B.3. Market scale:** Massive market scale for consumer and industrial AI	N.A.
	C. Policy and regulation	**C.1. Labour and talent pool:** Strong STEM talent **C.3. International standards:** Leadership in developing and emerging market nations/ G20 and BRICS+	**C.2. Domestic standards:** Nascent and under development

Source: Authors.

Appendix 3: Key Takeaways for G7 Policy Makers

1. **The report identified three conduits (technological capabilities, applications and markets, and policy and regulation) in its assessment of productivity pathways across the G7 countries. The assessment included China and India for comparison.**

   - Established **indices provide a good source for comparing and aggregating AI data and indictors**, and four were used here: the Stanford Global AI Vibrancy Tool, the Oxford Insights Government AI Readiness Index, the IMF AI Preparedness Index and the WIPO Global Innovation Index.

   - G7 countries are generally **challenged to ensure that they develop, train/retrain and maintain the required specialized labour and talent pool needed for AI.** International students represent a significant share of AI-related degrees obtained in G7 countries and populate the talent pool, and they have also contributed significantly to the AI technology sector in recent years. New forms of training will also be needed, such as prompt engineering. While G7 countries are taking some steps to attract and retain global talent, competition is growing, and it will require focused efforts to stop erosion.

   - **Access to large pools of private capital** and the ability to scale start-ups into global contenders diverge across G7 countries, with the United States in a group of its own. In 2024, US private AI investment reached US$109 billion, more than 10 times China's US$9.3 billion, and far above other G7 countries (Stanford Institute for Human-Centered Artificial Intelligence 2025, 3). Outside of the United States, capital markets remain underdeveloped. A key focus is creating **conditions for AI companies to scale domestically, including through larger late-stage funding rounds, initial public offering opportunities and supportive regulation.**

   - SMEs form the backbone of G7 economies yet generally lag large firms in AI adoption. **If SMEs do not further leverage AI, productivity gains will be far less, and firm competitiveness could be hindered.** Governments can provide SMEs with support, such as targeted training and tools, access to digital infrastructure and clear regulatory frameworks, as well as strengthening their freedom to operate in the data-based environment of AI.

   - All G7 countries offer some form of R&D tax incentive, though structures and conditions vary. These **tax policies aim to lower the cost and risk of AI innovation** and can create a broad-based pull for smaller firms to experiment with AI. Given the efficiency and effectiveness of the instrument, there may be scope for further targeted incentives in some G7 countries to help drive adoption as well as AI alignment with societal goals.

   - **Digital infrastructure is critical for AI adoption**, and while all G7 economies have 5G mobile networks, coverage and performance vary. Compute capacity (especially for training large AI models) has become a strategic asset. In addition, open data platforms and interoperability standards will be important across the G7 and beyond to ensure data is shared and utilized. Equally important are **electrical power grids and energy policies that can support the digital economy's growth and align with sustainability goals.**

   - **Regulatory and legal frameworks** are essential for AI policies to succeed across borders, including compatible standards on data privacy and IP rights. At the same time, governments need to **adopt agile national policy tools that can evolve** and keep up with emerging AI technologies.

2. **Effectively steering productivity gains from AI at the national level includes navigating high levels of uncertainty. The country-level analysis above informs plausible futures for AI's impact on productivity and is captured in four different scenarios.**

   - **Scenario analysis provides a structured approach without presuming a single forecast and can support a deliberative policy process.** This can help avoid strategies that are overfitted to a single view and can also identify no-regrets policies that are valuable across more than one scenario. This approach can be particularly useful in the case of AI given uncertainties surrounding the evolution of:

     – technology trajectories (for example, power of algorithms);
     – socio-economic and political responses (for example, public trust, regulation);
     – market structure (for example, big tech, open source); and
     – geopolitics (for example, level of international cooperation).

Figure A3: Potential Scenario Impacts on Productivity

AI-Driven Productivity Scenarios	Projected Trend of Core Transmission Conduits			Productivity – G7 Impact and Distribution
	Technological Capabilities	Applications and Markets	Policy and Regulation	
Flat AI — stagnation				- Suboptimal - Narrow gains
US-led AI — tech friendshoring				- Significant - Skewed to US and allies
Multipolar AI — a thousand flowers bloom				- Significant - Benefits diffused relatively evenly
AGI — revolution				- Very significant - Global benefits, but gaps and inequality remain

Source: Authors.

   - Scenarios can provide a good basis for **national analysis as well as a rationale for exploring greater G7 coordination**, including on issues of common interest such as AI data security and integrity, and potentially on infrastructure (for example, compute or energy), to further secure systems and leverage economic growth.

   - Effective adoption of AI in the G7 will also hinge on **governance**. By further building on the G7 Hiroshima AI Process and **establishing ongoing G7 coordination processes or structures**, such as a G7 AI Council, member countries could evaluate progress, address common challenges and consistently share best practices.

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