

**Quantifying the impact of Artificial
Intelligence on the Scottish Economy**
Final report for Scottish Enterprise
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Insight



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1 Introduction

Overview

- 1.1 GC Insight were commissioned by Scottish Enterprise to prepare analysis on the potential economic impact of Artificial Intelligence (AI), to better understand the potential economic benefit it can bring to the Scottish economy. This study builds on a previous commission to deliver strategic ideation, planning and assessment expertise to inform future strategic priorities for investment in the digital and high value manufacturing sectors, of which AI is a component part.

Context

- 1.2 Though it has been used for some time, AI is still a nascent technology. The pace of development in AI is unprecedented, and this is set to continue. It will increasingly be part of how we live, work, learn and do business. UK Government research with the AI industry suggests that developing new AI product(s) is the main growth driver, reported by 74% of industry respondents. This is ahead of improving current products (61%). These findings illustrate the rapid development of the industry.¹
- 1.3 The estimated size of the global AI market in terms of revenue was \$638 billion in 2024. This is anticipated to increase to reach \$3.7 trillion by 2034. This also has significant impacts for other sectors, with 87% of organizations worldwide believing AI technologies will give them a competitive edge, and AI is suggested to improve business productivity by up to 40%. Estimates suggest that the global manufacturing industry alone, can grow by up to \$3.8 trillion by 2035 due to AI adoption.²
- 1.4 There are a number of factors driving the growth of the AI industry. Advancements in machine learning algorithms and expanded computing power are increasing the power of AI technology, while big data availability, and the proliferation of connected devices enabling the Internet of Things (IoT) are increasing its capacity to support in a broader range of industries.
- 1.5 AI is also increasingly understood by businesses as a tool to streamline processes, personalise customer experiences, and optimise decision-making, further increasing adoption and fuelling market expansion. As such, AI will radically change the way we do business, and ultimately the way we live.
- 1.6 Continuous development of digital technology is recognised by the UN as being central to achieving Sustainable Development Goals.³ There are a wide range of intersecting market drivers for Digital Technology, and specifically in AI and Data. As discussed, it is central to the future of the production and delivery of goods and services and is driven by the integration of industry 4.0 technologies. It is seen as a key solution to help to achieve net zero objectives and tackle the implications of workforce challenges in a range of sectors such as health and social care,

¹ <https://www.gov.uk/government/publications/artificial-intelligence-sector-study-2023/artificial-intelligence-sector-study-2023>

² <https://www.precedenceresearch.com/artificial-intelligence-market>

³ <https://www.sdg-digital.org/>

construction, transport and energy. It is not limited to one or two sectors, it will deliver benefits, and is necessary for the whole economy, with no sector being untouched.

- 1.7 As businesses across the Scottish economy integrate industry 4.0 technologies to boost productivity, AI is increasingly vital to activities across all sectors. For example, AI is being implemented throughout health and social care in Scotland, such as to support radiologists interpret diagnostic images, and used alongside data to provide personalised patient plans based on medical history.⁴
- 1.8 Equally, AI and data intelligence are absolutely critical in finance and professional services. They are being used to improve security by predicting and preventing fraudulent activity, and to deliver services. It is also being applied in more traditional sectors such as manufacturing and construction for example to improve safety and achieve efficiencies through predictive maintenance and automation, managing supply of materials, and waste management.
- 1.9 AI is also central to Scotland's key emerging sectors such as space, life sciences pharmaceuticals, and renewable energy, as well as supporting net zero ambitions. AI is being used to analyse data such as patterns of weather activity to manage heat needs and efficiency, energy grid algorithms to prevent issues from arising, and decision support systems to improve management of multiple energy sources such as hydrogen.
- 1.10 Given this, it is important to understand how AI might impact the Scottish economy. This will inform the way in which Scottish Enterprise and partners shape support for AI adoption, production and supporting infrastructure, to maximise its potential impact for the Scottish economy.

Project scope

- 1.11 The objective of the research is to articulate and model the potential impact of AI on the Scottish economy. In terms of scope, this project is to:
- Review national and international reports, datasets and other intelligence on the economic impact of AI;
 - Consider the advantages and disadvantages of the methodologies used, and give consideration to how the existing evidence base could be used to quantify the potential economic impact of AI within the Scottish economy; and
 - Provide a range estimate of the economic impact of AI in terms of adoption, production and infrastructure, with appropriate caveats and confidence supporting the modelling.
 - Set out some considerations for future activity and support areas for Scottish Enterprise.

Report structure

- 1.12 The report is structured as follows:
- **Chapter 2** sets out the method and approach for this study;
 - **Chapter 3** summarises the literature review of secondary evidence on the impacts of AI;
 - **Chapter 4** details our modelling approach and findings; and

⁴ <https://digitalpublications.parliament.scot/ResearchBriefings/Report/2024/6/25/1373556b-9298-42d4-8a24-0e493b84cec9>

- **Chapter 5** presents summary conclusions and considerations for future modelling approaches.

2 Method and approach

Overview

- 2.1 The study took an iterative approach to developing the impact modelling given the availability and nature of the intelligence available. This chapter summarises the approach taken by the GC Insight study team.

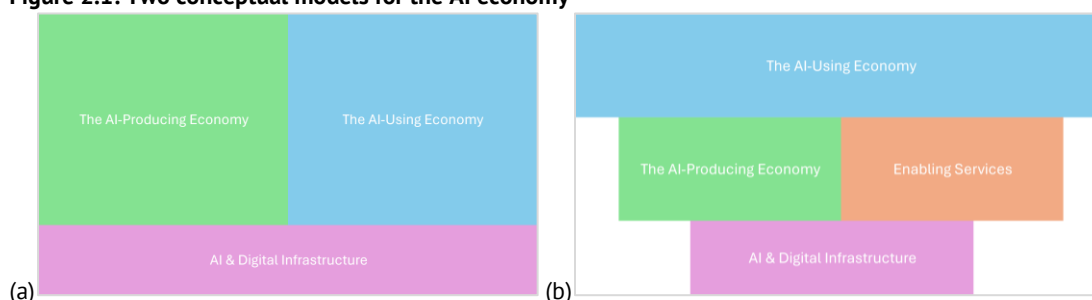
Method and approach

Stage 1: Research framework development

- 2.2 There are different types of economic benefits of AI to the Scottish Economy. The GC Insight team took a structured approach to considering the evidence available, and developed a research framework structured around three key types of AI activity. This was influenced by two conceptual models of the AI economy, set out in Figure 2.1 below. Whilst the former (left-hand side) model has been used for the purposes of this report, due cognisance has been given to the latter (right-hand side) model. The model of infrastructure-production-consumption/use can be considered as follows:

1. **AI infrastructure:** i.e. the processors, data centres or physical connectivity need to support the growth in AI, some of which will be based in Scotland.
2. **AI production:** This includes the development of **AI models**, creating the underpinning AI solutions used by AI applications, e.g. Gemini (formerly Bard), ChatGPT, Grok, Claude and Copilot, as well as the development of **AI solutions** (see below). Although much of this work (particularly with regard to AI models) is being done in the US, latterly there have been new entrants to the market such as DeepSeek from China. There may also be Scottish companies supplying directly into these market activities.
3. **AI consumption or AI adoption/use:**
 - a. This is largely the impacts associated with the use of AI by
 - i. Businesses to improve productivity and efficiency, and
 - ii. The use of AI by the public sector to improve efficiency and service improvement.
 - b. This may also include **AI solutions development:** Scottish-based businesses creating new solutions using AI models. This may include in-house solutions to improve productivity, or new products/services to be externally sold including those in development (this is considered to straddle AI consumption/use and AI production).

Figure 2.1: Two conceptual models for the AI economy



- 2.3 From this, we considered impacts in turn to develop a composite view of the impact of AI on the Scottish economy. This will provide insight on the overall 'size of the prize' for Scotland.

Stage 2: Desk based literature and data review

- 2.4 To develop the evidence base for informing our modelling of the potential impacts of AI on the Scottish economy, and to identify appropriate benchmarks and metrics for use, we have reviewed the following:
- Relevant Scottish and UK AI strategies and policies;
 - UK and international AI industry intelligence, studies and research;
 - Evidence on AI impact from academic research sources; and
 - A variety of business data sources to provide baseline figures and additional insight into the size and growth potential within the AI sector in Scotland.
- 2.5 The findings from the review were organised according to the research framework.

Stage 3: Methodology review

- 2.6 Using the Research Framework, we have reviewed the methods used in existing research and looked at how the findings are relevant, and how this can be extrapolated to provide quantifiable economic benefits to the Scottish economy. This considers the following:
- Where these are identified, what inputs and assumptions (including definitions) have been used in producing the estimates of economic impact?
 - The potential for findings to be proportionately applied to the Scottish economy. e.g., if Scotland produced approximately 8% of UK GDP, how appropriate would it be to assume 8% of forecast benefits from identified UK-level evidence?
 - How appropriate is identified evidence to the Scottish context? For example, is evidence on AI growth and productivity in China applicable to Scotland?
 - What modifications to projections may be needed to reflect the Scottish business base and nature of the opportunity across each of the three AI components outlined in Stage 1?
- 2.7 A high-level summary of the findings from Stages 2 and 3 are summarised in Chapter 3.

Stage 4: Modelling and reporting

- 2.8 Based on the outputs of the preceding stages, the GC Insight team prepared modelling to estimate the impact of AI on the Scottish economy over a 10-year period, i.e. to 2035.
- 2.9 The modelling is presented in Chapter 4.

3 Literature review

Introduction

- 3.1 As AI technologies continue to advance, their impact on the global economy becomes increasingly significant. This literature review aims to explore the economic impact of AI, synthesising insights from a wide array of studies and reports. The review explores AI's potential to enhance GDP, boost productivity, influence employment patterns, and drive infrastructure development. Additionally, it critically assesses the strengths and limitations of current research in this field.

Key findings

Economic growth and GDP impact

AI's Impact on GDP

- 3.2 According to the IMF, AI has the potential to drive significant economic growth by enhancing productivity, fostering innovation, and creating new market opportunities. AI can be integrated across various sectors, leading to improvements in efficiency and effectiveness. For instance, AI can automate routine tasks, allowing human workers to focus on more complex and creative activities, thereby increasing overall productivity, and ultimately creating higher paid jobs.⁵ This shift not only boosts output but also enhances the quality of goods and services, leading to higher consumer satisfaction and increased economic activity.
- 3.3 Moreover, according to research in the Journal of Economic Structures, AI can drive innovation by enabling new business models and services that were previously unachievable. For example, AI-driven data analysis can uncover insights that lead to the development of new products or the optimisation of existing ones. In healthcare, AI can assist in diagnosing diseases more accurately and developing personalised treatment plans, which can improve patient outcomes and reduce costs. In finance, AI algorithms can enhance risk management and fraud detection, leading to more secure and efficient financial systems. These innovations can create new industries and job opportunities, further contributing to economic growth.⁶
- 3.4 Additionally, research by Brookings states AI can enhance economic growth by improving decision-making processes within organisations. By leveraging AI for predictive analytics, companies can make more informed decisions regarding inventory management, marketing strategies and customer service. This leads to better resource allocation and reduced waste, which can lower operational costs and increase profitability. Furthermore, AI can facilitate the expansion of businesses into new markets by providing insights into consumer behaviour and market trends, enabling companies to tailor their offerings to meet the specific needs of different regions.⁷ While the integration of AI presents challenges, such as the need for workforce adaptation and the management of potential job displacement, the overall potential for economic benefits is substantial.

⁵ IMF, AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity, 2024

⁶ Journal of Economic Structures, Implications of AI innovation on economic growth: a panel data study, 2023

⁷ Brookings, Harnessing AI for economic growth, 2025

Forecasts

- 3.5 The forecasts of AI's impact on GDP vary significantly by source. For example, a 2024 study by the Tony Blair Institute for Global Change's most prudent scenario predicts AI will **grow the UK's GDP by 0.6% by 2035**. However, the study's most optimistic forecast claims the **UK's GDP could grow by 6%** over the same time period – highlighting the significant variation between modelling scenarios.⁸
- 3.6 On the other end of the spectrum, the most optimistic forecast, a 2018 study by PwC estimates that **global GDP may increase by up to 14% (the equivalent of US\$15.7 trillion) by 2030**.⁹ Other forecasts range from 1.1% global GDP uplift to 13%.
- 3.7 Many of the more optimistic forecasts, like the 2018 PwC study, stem from older studies. Similarly, a Bank of America (BoA) Merrill Lynch study in 2015 anticipated that within a decade, robotics and AI would generate an annual 'impact value' ranging between \$14 trillion and \$33 trillion¹⁰. These early forecasts were characterised by their high expectations and broad estimates, reflecting the initial excitement surrounding AI's potential. However, as our understanding of AI's impact on the economy has evolved, more recent studies have adopted a more cautious and nuanced approach. Researchers now recognise the complexities and challenges associated with AI implementation.
- 3.8 For this analysis, we have utilised the scenarios proposed by the Tony Blair Institute for Global Change report to inform our modelling. This recent study, published in 2024, focuses specifically on the UK and employs a robust, evidence-based methodology. The report provides a comprehensive examination of AI's potential impact, considering various dimensions such as regional disparities, sector-specific effects, and occupational shifts. The study's approach provides a well-rounded foundation for our modelling, enabling us to generate more accurate and insightful projections on the impact of AI on Scotland's GDP. We have used the **central base scenario of 1.10% GDP uplift**, a **modest uplift of 3.90%** and an **optimised uplift of 7.5%**.

Impact of AI adoption on productivity, efficiency and costs savings

AI's impact on productivity

- 3.9 According to a study by PwC, AI will lead to significant productivity gains in the near term, primarily through the automation of routine tasks.¹¹ This impact is expected to be particularly pronounced in capital-intensive sectors such as manufacturing and transport. In these industries, the extended use of technologies like robots and autonomous vehicles will play a crucial role. For instance, in manufacturing, AI-powered robots can handle repetitive and hazardous tasks with greater precision and efficiency than human workers, leading to increased output and reduced operational costs. Similarly, in the transport sector, autonomous vehicles can optimise logistics and reduce downtime, enhancing the overall efficiency of supply chains.
- 3.10 Moreover, productivity improvements will not be limited to automation alone. Businesses will also see gains by complementing and assisting their existing workforce with AI technologies. AI can augment human capabilities by providing tools that enhance decision-making, streamline

⁸ Tony Blair Institute for Global Change's, The Impact of AI on the Labour Market, 2024

⁹ PwC, The macroeconomic impact of artificial intelligence, 2018

¹⁰ Chatham House, Artificial Intelligence and International Affairs, 2020

¹¹ PwC, The macroeconomic impact of artificial intelligence, 2018

workflows, and facilitate complex problem-solving. However, the speed and scale of AI's impact remain uncertain. While the potential for transformative effects is substantial, several factors can influence the pace of adoption. These include regulatory frameworks, public perception, and the readiness of businesses and workers to embrace AI technologies.

Forecasts

- 3.11 Recent literature exploring the productivity impacts of AI highlights a wide spectrum of potential outcomes. Studies by Brookings¹², Goldman Sachs¹³, and OECD¹⁴ each present a range of scenarios – from moderate productivity gains to transformative economic growth.
- 3.12 Goldman Sachs, for instance, estimates that **AI could raise labour productivity for the United States by 1.5 percentage points annually over a 10-year period** under optimistic conditions, following widespread adoption, although the increase in labour productivity growth could vary significantly based on the complexity of tasks AI can handle and the extent of job automation. Brookings presents a more measured case, arguing that while AI holds the potential to replicate a “general-purpose technology” boost akin to electrification or the internet, the realisation of these gains depends on complementary investments in skills, infrastructure, and digital adoption. They still project **an uplift of around 1.5%–2.5% annually in labour productivity**.
- 3.13 The OECD further underscores the sectoral variation in AI impact, which our modelling accounts for via AI intensity weights. High AI-intensity sectors like financial services, ICT, and professional, scientific and technical activities are classified as highly AI intensive. In contrast, sectors with lower digital maturity – such as primary industries, accommodation and food services, construction, and education – may achieve lower gains as they see better efficiency rather than structural transformation.
- 3.14 A separate OECD report on the impact of AI on productivity broadly agrees on the factors influencing the scale of productivity gains. Key drivers include: the share of cognitive vs. manual tasks within each sector; availability of skilled labour; capital investment in AI technologies; regulatory and ethical frameworks; and organisational readiness to redesign workflows around AI tools.

Impact of AI adoption on employment

AI's impact on employment

- 3.15 The impact of AI adoption on employment remains uncertain, with varying perspectives from different studies and analysis. This uncertainty stems from the diverse nature of job roles and the varying degrees to which AI can complement or replace these roles. There are also differing views on the extent to which various job roles are exposed to AI and how AI complements these roles. Some analysis suggest that AI will significantly impact certain roles, while others indicate a more moderate effect.
- 3.16 For example, a study by the IMF suggests that approximately 70% of roles in the UK are highly exposed to AI.¹⁵ These roles are equally distributed between positions with high complementarity

¹² Brookings, Machines of mind: The case for an AI-powered productivity boom, 2024

¹³ Goldman Sachs, The Potentially Large Effects of Artificial Intelligence on Economic Growth, 2023

¹⁴ OECD, The impact of Artificial Intelligence on productivity, distribution and growth, 2024

¹⁵ IMF, Gen-AI: Artificial Intelligence and the Future of Work, 2024

(where AI enhances job performance) and low complementarity (where AI may replace human tasks). Contrary to the IMF's findings, other research such as a study by the International Labour Organisation indicates that most jobs and industries are only partly exposed to automation. These studies suggest that AI is more likely to complement existing roles rather than fully automate them, thereby enhancing productivity without necessarily displacing workers.¹⁶

- 3.17 Research by the Department for Education (DfE) suggests that occupations in Scotland are less exposed to AI compared to the rest of the UK. Specifically, the exposure rating in Scotland is about 40% of that in London, indicating regional variations in AI impact.¹⁷ Research by PwC for the Department for Business, Energy and Industrial Strategy (BEIS) suggests that AI will have negligible effect on net employment over a 20-year period. This implies that while AI may change the nature of work, it is unlikely to lead to significant jobs losses.¹⁸
- 3.18 A study from Humanities and Social Sciences Communications, indicates that AI may actually increase employment or at least promote it by refining the division of labour, improving productivity, and enhancing value added. These findings suggest that AI can create new job opportunities and improve the efficiency of existing roles.¹⁹

Forecasts

- 3.19 Given the varying perspectives and findings, this research has **assumed that AI adoption will not have a uniform impact on employment**. While some roles may be highly exposed to AI, others will be complemented by it, leading to a dynamic and evolving job market. Overall, AI is expected to enhance productivity and create new opportunities, rather than causing widespread job displacement.

AI infrastructure

AI's impact on infrastructure

- 3.20 According to a study released by Barclays, there will be a substantial increase in energy consumption driven by AI infrastructure.²⁰ The report highlights that data centres, which are crucial for training and operating AI models, currently consume between 1.0% and 1.5% of global electricity. This figure is expected to rise dramatically, with projections indicating that AI could drive US data-centre usage to triple by 2030, reaching approximately 560 terawatt hours (TWh), equivalent to 13% of current US electricity demand.
- 3.21 The report also underscores the environmental implications of this surge in energy demand. Efforts to conserve power through efficiencies are likely insufficient to offset the proliferation of AI, raising urgent questions about the feasibility of achieving global net-zero emissions targets. The balancing act between advancing AI technology responsibly and meeting emissions targets is identified as a critical global challenge. Policymakers, tech companies, and the energy industry

¹⁶ ILO, Generative AI and jobs: A global analysis of potential effects on job quantity and quality, 2023

¹⁷ DfE, The impact of AI on UK jobs and training, 2023

¹⁸ PwC/BEIS, The Potential Impact of Artificial Intelligence on UK Employment and the Demand for Skills, 2021

¹⁹ Humanities and Social Sciences Communications, The impact of artificial intelligence on employment: the role of virtual agglomeration, 2024

²⁰ Barclays, AI revolution: Meeting massive AI infrastructure demands, 2025

are urged to forge new partnerships to ensure that AI development is both socially beneficial and environmentally sustainable.

- 3.22 Private sector companies have already started to make massive capital investments in AI infrastructure. For instance, in 2025 alone, Amazon plans to spend \$100 billion, Alphabet (Google) \$75 billion, Meta between \$60 billion and \$65 billion, and Microsoft \$80 billion.²¹ These investments are indicative of the anticipated transformative impact of AI on the global economy. However, geopolitical and strategic tensions may arise from the global race for AI pre-eminence. As countries and companies invest heavily in AI infrastructure, the strain on resources could lead to significant geostrategic shifts – such as changes in competitive advantage, reshaping of supply chains, influencing (negatively or positively) international co-operation and potentially altering the existing balance of power between nations.²²

Forecasts

- 3.23 Due to the limited research available on the economic impact of AI on infrastructure, we have utilised Scottish Enterprise's report "Green Data Centres: Approach to Estimating Economic Impact" to inform our analysis. This report employs three rollout scenarios – maximum, medium, and low – to estimate the one-off and full-time jobs created by the construction of Green Data Centres in Scotland. The methodology used in the report is based on robust evidence, ensuring the reliability of the findings.

Strengths and weaknesses

- 3.24 There are a number of strengths and weaknesses of modelling in the existing literature. These points are explored below:

Strengths

Mixed methods data collection

- 3.25 Many reports utilise mixed methods approaches, integrating both quantitative and qualitative research techniques to provide comprehensive insights. For instance, the Perspective Economics²³ report on the UK's AI sector for the Department for Science, Innovation and Technology (DSIT) combines detailed secondary data analysis with 45 in-depth interviews with stakeholders, alongside an online survey of AI companies. This multifaceted approach ensures a thorough sector profiling, capturing diverse perspectives and data points.
- 3.26 Furthermore, Public First's report²⁴ on unlocking the UK's AI potential, commissioned by Microsoft, employs a statistically robust survey of over 1,000 senior business decision-makers. In addition to this survey, the report leverages AI to model productivity gains and infrastructure needs, offering an understanding of the potential impacts and requirements for future growth. By employing mixed methods, these reports are able to draw on the strengths of both quantitative and qualitative research, providing a detailed analysis that can inform modelling.

²¹ Sean Kinney, The AI infrastructure boom—fueling the next economic revolution?, 2025

²² See for example: <https://www.goldmansachs.com/insights/articles/the-generative-world-order-ai-geopolitics-and-power>; <https://www.rusi.org/explore-our-research/publications/commentary/deepseeks-disruption-geopolitics-and-battle-ai-supremacy> <https://www.gov.uk/government/publications/artificial-intelligence-sector-study-2023>

²⁴ <https://microsoftuk.publicfirst.co.uk/>

Granular segmentation and taxonomy

- 3.27 While most studies do not achieve this level of detail, the more comprehensive reports strive to provide granular segmentation and taxonomy regarding the impacts of AI on the economy. For instance, PwC's report²⁵ constructs a global 'AI Impact Index' that encompasses nearly 300 use cases. These use cases are integrated into a spatial model, which delivers projections at regional and sectoral levels for GDP and household spending. This approach allows for a nuanced understanding of how AI influences various economic dimensions, offering insights into specific geographic areas and industry sectors. By breaking down the impacts into detailed segments, such studies can provide useful insights for modelling the economic impact of AI on Scotland.

Robust modelling

- 3.28 Several studies reviewed during this project provide robust economic models that offer valuable insights into the future impacts of AI. For example, the Tony Blair Institute²⁶ introduces scenarios for adoption and task creation to map potential unemployment peaks and GDP boosts by 2050. These scenarios provide a range of outcomes, helping to illustrate the diverse ways AI could influence economic dynamics in the UK market over the coming decades. This provides a useful foundation for generating scenarios of the impact of AI on the Scottish economy.

Weaknesses***AI is changing rapidly***

- 3.29 AI technologies and applications are continuously advancing, leading to new findings and insights. This rapid evolution means that literature can quickly become outdated. For example, the 2017 report from PwC forecast GDP worldwide could be as much as 14% higher in 2030 because of AI technologies. However, a 2023 journal article for the Journal of Electronic Business and Digital Economics states the use of AI could also boost labour productivity growth and increase global GDP by 7% per year over a 10-year period. The significant variation in these forecasts highlights how predictions can quickly become outdated as new information becomes available.

Ove-reliance on high-level aggregates

- 3.30 Many of the reports reviewed during this project do not provide a detailed breakdown of the impacts of AI. Understanding the nuanced effects of AI on different sectors, regions, and occupations is crucial for accurately calculating its economic impact. While current reports may lack this level of detail, future research is expected to offer clearer insights. As methodologies and data collection techniques improve, we anticipate more comprehensive analysis that will highlight how AI affects various aspects of the economy.

Sponsorship and optimism bias

- 3.31 Many of the studies reviewed are sponsored or developed by organisations that will benefit from the adoption of AI. For example, The Public First report, while methodologically sound, is funded by Microsoft, raising the possibility of emphasising cloud and datacentre investments aligned with Microsoft's strategic interests.

²⁵ <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>

²⁶ <https://institute.global/insights/economic-prosperity/the-impact-of-ai-on-the-labour-market>

Limited transparency on assumptions

- 3.32 Many of the reports reviewed provide high-level methodological overviews but often omit detailed parameter values and assumptions. This lack of transparency hinders replication and sensitivity testing, making it challenging to validate the findings or explore how changes in assumptions might affect the results. Furthermore, many studies have a longlist of assumptions where a small change could drastically alter the results.

4 Modelling the potential economic impact of AI in Scotland

Introduction

- 4.1 Following the discussion of existing research, analysis and modelling of impacts of AI on economic activity, this chapter sets out GC Insight's modelling of the potential impacts of AI on the Scottish economy.
- 4.2 Impacts across three broad AI segments are considered, in line with the research framework outlined in Chapter 2. Forecasts are set out separately below to present a composite picture of potential AI impact on the Scottish economy.

Overview of approach

AI adoption

GDP

- 4.3 Our approach to calculate the impact of AI on Scotland's GDP involved applying evidence gleaned from desk review regarding estimated impact of GDP to data and forecasts on Scotland's GDP. This allowed us to generate a set of forecast scenarios for AI-influenced GDP growth in Scotland.
- 4.4 First, GDP forecasts produced by the Scottish Government, Fraser of Allander Institute, and the Scottish Fiscal Commission were reviewed, and an average of the three forecasts, in line with nominal GDP figures for 2023 from Scottish Government GDP quarterly national accounts, was taken as the baseline.
- 4.5 A range of forecast growth figures were reviewed to develop a suite of multipliers to inform AI impact forecast scenarios. Scenarios were informed by the differing ranges of forecasts available in the public domain for AI-driven growth in GDP over a 10-year period, ranging from very conservative modest uplifts to more bullish and optimistic forecasts setting out much higher GDP uplifts from AI. A set of scenarios established by the Tony Blair Institute²⁷ was also used to inform the preparation of forecast scenarios.

Assumptions and caveats

- 4.6 In developing the assumptions of the scenarios for AI-driven GDP uplift, consideration was given to the applicability of forecasts to the Scottish context. This included the markets those forecasts originated from (e.g. North America, Europe, Asia, etc.), extent to which any optimism bias was evident, along with any other issues in line with those identified in Chapter 3, and so on.
- 4.7 As such, the following uplift factors were adopted.

²⁷ <https://institute.global/insights/economic-prosperity/the-impact-of-ai-on-the-labour-market#the-potential-impact-of-ai-on-labour-markets>

Table 4.1: AI-driven GDP uplift factors

Scenario		Range	10-yr uplift	AI uplift p.a.
Base	AI continues to be adopted by businesses in line with current trends, AI sector develops, but potential growth is not optimised	<i>Lower</i>	0.60%	0.06%
		Central	1.10%	0.11%
		<i>Upper</i>	1.60%	0.16%
Moderate	Public sector intervention and a modest increase in private sector AI adoption stimulates some uplift in anticipated impacts over and above expected rates under the <i>Base</i> scenario	<i>Lower</i>	3.30%	0.33%
		Central	3.90%	0.39%
		<i>Upper</i>	4.50%	0.45%
Optimised	Public sector intervention and higher private sector AI adoption stimulates a higher uplift in anticipated impacts of an order above the <i>Moderate</i> scenario	<i>Lower</i>	6.00%	0.60%
		Central	7.50%	0.75%
		<i>Upper</i>	9.00%	0.90%

- 4.8 These are set aside a null growth forecast, which is assumed to be the average of GDP forecasts from Scottish Government, Fraser of Allander Institute, and the Scottish Fiscal Commission. This essentially takes existing GDP forecasts, with existing patterns of AI growth, as the base against which our scenarios are modelled to demonstrate the potential difference in GDP growth.

Productivity

- 4.9 The modelling approach for estimating the productivity impact of AI centres on sector-specific forecasts of Gross Value Added (GVA) per head of employment, using a bottom-up method rooted in official datasets and internationally recognised AI intensity classifications. Baseline 2023 GVA per head is calculated from the ONS Regional GVA and BRES Employment datasets. A “null” growth rate is assumed across all sectors, aligned with subdued productivity growth forecasts from the Scottish Government, Scottish Fiscal Commission, and the Fraser of Allander Institute, thereby isolating the marginal effects of AI.
- 4.10 Each sector is assigned an AI intensity weight, drawn from the OECD’s Sectoral Taxonomy of AI Intensity. These weights reflect each sector’s technological readiness and potential for AI integration. A median AI intensity of 0.6 is applied across “all industries” to demonstrate the extent to which it is assumed AI will influence productivity generally, with high-intensity ratings (1.0) assigned to digital-forward sectors like finance, ICT, and professional services, and lower ratings (0.2) to labour-intensive sectors such as construction, health, and accommodation.

Assumptions and caveats

- 4.11 Scenario uplift rates – 1.5%, 1.8%, and 2.5% per annum – are derived from literature including a study by the Brookings Institution, which estimate AI’s long-run impact on annual productivity growth. The effective productivity gain for each sector is calculated by multiplying its AI intensity weight with the scenario uplift rate to derive the effective productivity gain. This effective gain is then compounded annually from 2024 to 2035 to generate sector-specific projections.

$$\text{GVA per head}_{\text{AI scenario}} = \text{GVA per head}_{\text{(previous year)}} \times (\text{Null Growth Rate} + \text{Effective Productivity Gain})$$

Table 4.2: AI impact scenarios for productivity

Scenario	AI uplift p.a.	Explanation
Base	1.5	Reduced level of productivity increase versus <i>Moderate</i> scenario
Moderate	1.8	Result from 30% productivity increase in cognitive tasks which make up 60% of labour inputs
Optimised	2.5	The growth effect assumes a 1 percentage point increase in the <i>Base</i> AI-driven annual growth rate, driven by higher productivity of cognitive workers engaged in research and innovation

Infrastructure

- 4.12 To calculate the impact of AI related infrastructure on the Scottish Economy, we have used Scottish Enterprise's 'Green Data Centres: Approach to Estimating Economic Impact' study. Datacentres powered by renewable energy and international fibre connections are key parts of the digital economy. The ability to benefit from and make the most of AI will, in large part, be influenced by the ability to move data quickly and cost effectively across and between nations. In 2021, the Scottish government published the green datacentres and digital connectivity: vision and action plan for Scotland, aimed at building on capacity to generate energy from renewable sources. This makes Green Data Centres an important focus when modelling the economic impact of AI on the Scottish economy.
- 4.13 The results from Scottish Enterprise's 'Green Data Centres: Approach to Estimating Economic Impact' study illustrate the impacts from both capital expenditure and construction, and ongoing operation. Economic impact is presented through:
- **Jobs:** construction Person Year Equivalents (PYEs) and operational Full Time Equivalents (FTEs)
 - **Gross Value Added (GVA):** a quantitative measure of how much value any economic activity adds during its production i.e. the difference in the price of products/outputs and inputs, plus wages spend.

Infrastructure assumptions

- 4.14 The data forecasts low, medium and maximum roll out scenarios:
- **Maximum Scenario:** 3GW of hyperscale capacity, 2.5GW of distributed computing capacity and total capital investment of £44bn.
 - **Medium Scenario:** 1GW of hyperscale capacity, 500MW of distributed computing capacity and total capital investment of £12bn.
 - **Low Scenario:** 250MW of hyperscale capacity, 50MW of distributed computing capacity and total capital investment of £2.5bn.
- 4.15 Other assumptions included in the Green Data Centres report are as follows:

Construction phase

- Assumed 75% of construction spend occurs in Scotland. Displacement average of 18%.
- M&E equipment, such as generators and transformers: there is potential for some of this spend to be captured in Scotland (assumed 20% when calculating impacts).
- Multiplier effects to show indirect/induced benefits across supply chain and wider economy from:

- SIC 41-43: Construction
- SIC 27: Electrical Equipment
- PYE jobs in construction benchmarked to current major data centre proposals in UK – averaging £1.3m capex per construction PYE. For manufacturing, the average turnover/job for SIC 26-27 has been used (jobs = 1.8; GVA = 1.6).

Operational phase

- Employment: 0.5 FTEs per MW – consistent with Scottish proposals and evidence from elsewhere.
- Operational GVA derived from jobs only – assume leakage of profits outside of Scotland.
- No market displacement due to growing demand.
- Employment leakage likely minimal, but there will likely be some labour market displacement (i.e. poaching) as the industry grows.
- Multipliers effects from SIC 63 – Information Services (jobs = 1.3; GVA = 1.5).

Impact of AI services and production

- 4.16 At present, it is considered that there is insufficient data and intelligence available in the literature that is sufficiently robust to undertake an estimate of the impact of AI services and production. Recent research undertaken by Perspective Economics²⁸ for DSIT aims to deepen the understanding of the AI sector and quantify the contribution of the AI sector to the UK economy. Whilst the study does present some quantification of the scale of the AI sector in Scotland, there is insufficient detail at the sub-UK level in terms of business base profile and economic value to allow for any further modelling.
- 4.17 Similarly, recent research commissioned by Scottish Enterprise on Scotland's competitiveness and capabilities in AI²⁹ built on previous research to map the AI landscape in Scotland³⁰, and identified over 200 companies involved in AI in some way. However, it is understood that there is insufficient granularity to allow for a fuller estimate and forecast of economic value of Scotland's AI services and production sector specifically.
- 4.18 **Given this, we do not consider there to be sufficiently detailed and robust data for AI services and production at present to generate meaningful estimates and forecasts of AI production in Scotland.**
- 4.19 Nevertheless, the growing evidence base for AI in the UK and in Scotland is promising. It is expected that sufficient evidence will be available in due course to allow for modelling of current and future impact arising from AI services and production in Scotland.
- 4.20 **As such, any assumed growth amongst new and existing companies involved in AI services and production in Scotland is implicit in estimates of GDP impacts arising from AI adoption, set out below.**

²⁸ <https://www.gov.uk/government/publications/artificial-intelligence-sector-study-2023>

²⁹ Optimat, for Scottish Enterprise (2025) Scotland's Competitiveness & Capabilities in AI

³⁰ Optimat, for Scottish Enterprise (2023) Artificial Intelligence (AI) Research / Landscape Mapping

Impact of AI adoption

GDP and economic growth

- 4.21 Based on the AI uplift factors presented above, it is estimated that AI can potentially increase Scotland's GDP by between **£2.7bn** and **£19.3bn**: from +1.3% to +9% over the null scenario by 2035. Table 4.3 below sets out the impact scenarios in more detail.
- 4.22 In line with the uplift factors set out in Table 4.1 above, the following assumptions are made for each scenario, as follows:
- **Base:** AI continues to be adopted by businesses in Scotland in line with current trends, but without any substantive increase in adoption rates. Public sector intervention in AI remain broadly at current levels. The AI sector develops, but potential growth is not optimised. This scenario is in line with more conservative estimates produced by the Analysis Group (2016)³¹, and MIT (2024).
 - **Moderate:** Additional public sector intervention and a modest increase in private sector AI adoption (including increased growth in the AI production/services sector) stimulates some uplift in anticipated impacts over and above the expected rates under the Base scenario. This scenario is in line with mid-range estimates produced by the Tony Blair Institute for Global Change (2024).³²
 - **Optimised:** Substantively higher public sector intervention *and* private sector AI adoption (including a greater level of assumed growth in the AI production/services sector) stimulates a higher uplift in anticipated impacts of an order above the Moderate scenario. This scenario is in line with more optimistic estimates produced by the Tony Blair Institute for Global Change (2024), and Goldman Sachs (2023).³³
- 4.23 The central range of the *Moderate* scenario may see Scotland's GDP rise to almost £219bn by 2035. Under the upper range of the *Optimised* scenario, this may see up to £232.36bn GDP by 2035.
- 4.24 It is also worth noting that there will be additional benefits to the Scottish economy of these data centres being located *in* Scotland. This may mean easier and cheaper access for companies requiring AI services underpinned by such data centres. Whilst this was not explored fully in the Green Data Centres report, this is an area that could be explored more fully in future modelling work.

³¹ https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/ag_full_report_economic_impact_of_ai.pdf

³² Tony Blair Institute for Global Change (2024) The Impact of AI on the Labour Market, at:

<https://institute.global/insights/economic-prosperity/the-impact-of-ai-on-the-labour-market>

³³ Goldman Sachs (2023) The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani), at: <https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html>

Table 4.3: Anticipated AI impact on GDP in Scotland (£bn), by scenario

Nominal GDP		AI uplift p.a.	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
<i>Null</i>	-	-	177.6	179.6	182.0	184.6	187.0	189.6	192.3	194.9	197.7	200.4	203.3	206.2	209.0
Base	Lower	0.06%	177.6	179.8	182.3	184.92	187.4	190.2	192.9	195.8	198.6	201.5	204.5	207.4	210.5
	Central	0.11%	177.6	179.8	182.4	185.2	187.8	190.6	193.5	196.4	199.4	202.4	205.5	208.6	211.7
	Upper	0.16%	177.6	179.9	182.6	185.5	188.2	191.1	194.1	197.1	200.2	203.3	206.5	209.7	213.0
Moderate	Lower	0.33%	177.6	180.2	183.2	186.4	189.4	192.7	196.0	199.4	202.9	206.4	210.0	213.6	217.3
	Central	0.39%	177.6	180.3	183.4	186.7	189.9	193.3	196.7	200.3	203.8	207.5	211.2	215.0	218.8
	Upper	0.45%	177.6	180.4	183.7	187.0	190.3	193.9	197.4	201.1	204.8	208.6	212.5	216.4	220.4
Optimised	Lower	0.60%	177.6	180.7	184.2	187.9	191.5	195.3	199.2	203.2	207.2	211.4	215.6	219.9	224.3
	Central	0.75%	177.6	181.0	184.7	188.7	192.6	196.7	200.9	205.3	209.7	214.2	218.8	223.5	228.3
	Upper	0.90%	177.6	181.2	185.3	189.6	193.7	198.2	202.7	207.4	212.2	217.0	222.0	227.1	232.4

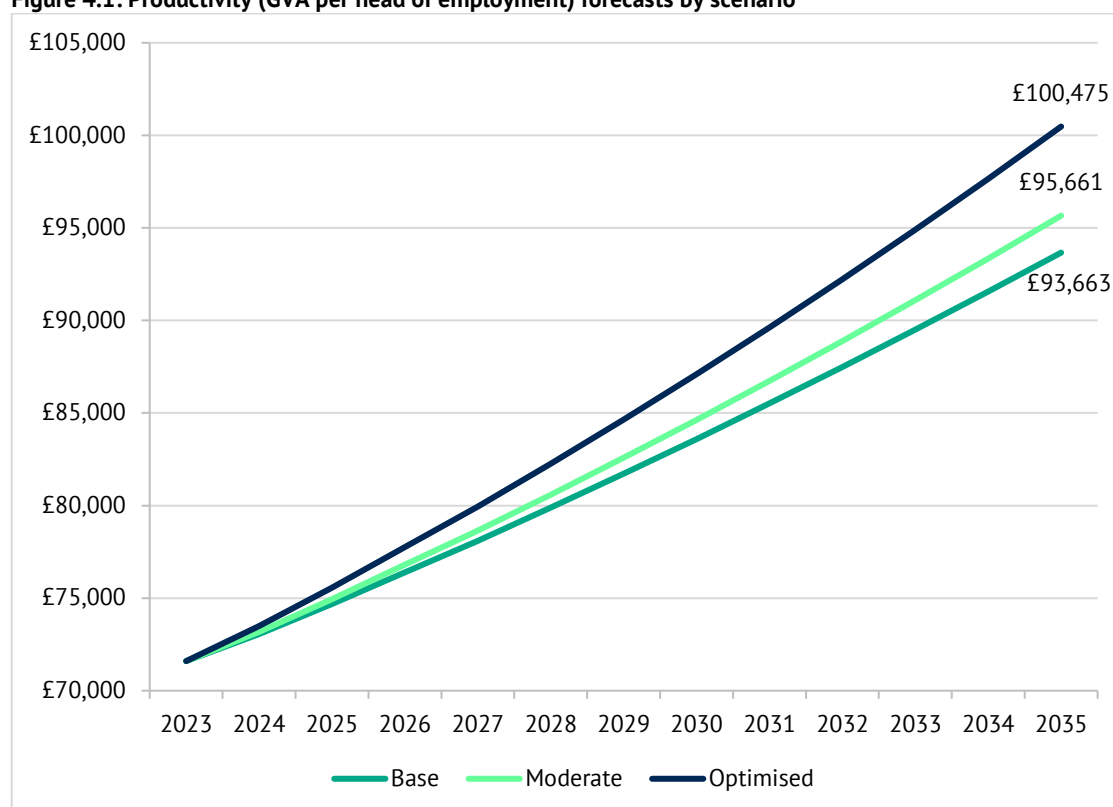
Constant 2023 prices

- 4.25 Assuming a base nominal GDP of almost £178bn in 2023³⁴, the forecast range from over £210bn to £232bn presents an indication of AI's potential, and also the uncertainty of generating such forecasts currently. Set against the assumed null scenario GDP value of £209bn for 2035, there is scope for AI to generate more than an additional £23bn in annual GDP. Over the period to 2035, there may be an additional cumulative GDP generated of £140.75bn over the period to 2025-2035.

Productivity

- 4.26 The resulting forecasts for productivity show significant variance across scenarios and sectors. Under the **Moderate scenario**, GVA per head of employment across all industries rises by 34% to £95,661 by 2035 (2023 prices). This scenario is considered most realistic – it assumes a 30% productivity gain in cognitive tasks, which make up 60% of labour inputs, reflecting achievable adoption levels with current technology. High-intensity sectors (e.g. ICT, finance, professional services) grow by up to 45%, while low-intensity sectors (e.g. construction, primary industries) grow by a more limited 23–25%, largely through efficiency rather than structural transformation.

Figure 4.1: Productivity (GVA per head of employment) forecasts by scenario



- 4.27 The **Base scenario** delivers gains of 31% overall (well above existing SFC data suggesting a rise in GDP per worker of c.6% between 2023 and 2029), capturing a slower pace of diffusion and lower task automation versus other scenarios. The **Optimised scenario** forecasts a 40% uplift (to GVA per head of £100,475), assuming a 1 percentage point increase in the baseline annual growth

³⁴ <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2024/05/gdp-quarterly-national-accounts-2023-q4/documents/other-quarterly-national-accounts-summary-tables/other-quarterly-national-accounts-summary-tables/govscot%3Adocument/%25282%2529%2BGDP%2BQNA%2B2023%2BQ4%2B-%2BOther%2Bnational%2Baccounts%2Bsummary%2Btables.xlsx>

rate, driven by enhanced productivity among highly skilled cognitive workers and R&D-intensive sectors. However, this relies on more speculative levels of AI diffusion and organisational change.

Table 4.4: Productivity (GVA per head) forecasts by industry and scenario

SIC07 description	AI Intensity	Baseline 2024	2035					
			Base (1.5%)	%	Moderate (1.8%)	%	Optimised (2.5%)	%
All industries	0.6	£71,598	£93,663	31%	£95,661	34%	£100,475	40%
Primary Industries	0.2	£101,612	£123,864	22%	£124,744	23%	£126,820	25%
Manufacturing	0.6	£103,545	£135,456	31%	£138,345	34%	£145,306	40%
Construction	0.2	£85,073	£103,703	22%	£104,440	23%	£106,178	25%
Wholesale and retail	0.6	£45,801	£59,916	31%	£61,194	34%	£64,274	40%
Transportation and storage	0.6	£54,431	£71,205	31%	£72,724	34%	£76,384	40%
Accommodation and food service activities	0.2	£25,269	£30,803	22%	£31,022	23%	£31,538	25%
Information and communication	1	£81,938	£114,984	40%	£119,074	45%	£129,139	58%
Financial and insurance activities	1	£185,880	£260,848	40%	£270,125	45%	£292,959	58%
Real estate activities	0.2	£618,306	£753,707	22%	£759,062	23%	£771,693	25%
Professional, scientific and technical	1	£66,141	£92,817	40%	£96,118	45%	£104,243	58%
Administrative and support service	0.6	£43,610	£57,050	31%	£58,267	34%	£61,199	40%
Public administration and defence	0.6	£77,356	£101,195	31%	£103,353	34%	£108,554	40%
Education	0.2	£55,852	£68,083	22%	£68,566	23%	£69,707	25%
Human health and social work	0.2	£50,447	£65,993	31%	£67,401	34%	£70,793	40%
Arts, entertainment and recreation	0.6	£35,486	£46,422	31%	£47,412	34%	£49,797	40%
Other service activities	0.6	£61,862	£80,926	31%	£82,652	34%	£86,812	40%

- 4.28 Overall, the forecast range – between 31% and 40% uplift in GVA per head – offers a structured, evidence-based view of AI's potential. It is influenced by sectoral AI intensity, pace of adoption, workforce adaptability, and real-world implementation barriers. The Modest scenario – with a 1.8% annual uplift in productivity is the most realistic. It reflects a balance between achievable technological progress and real-world constraints, including barriers to adoption in less digitised sectors and the time required for organisational change.

Impact of AI infrastructure development

- 4.29 Based on analysis undertaken by Scottish Enterprise, it is estimated that under the **medium scenario**, 10,900 'one-off jobs' in construction and electrical equipment sectors will be created. It also is estimated that 880 full-time jobs will be created, generating a total net GVA of £5.0bn to 2040. These figures have been adjusted to provide a **total net GVA of £4.5bn to 2035**.

Table 4.5: Timeline for *Maximum, Medium and Low* scenarios for AI infrastructure

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Total annual MW (Maximum Scenario)	0	10	120	520	600	700	600	700	400	500	250	350	300	250	200	200
Total annual MW (Medium Scenario)	0	10	60	120	270	240	190	200	150	50	50	50	40	50	10	10
Total annual MW (Low Scenario)	0	5	50	55	0	55	0	55	50	5	5	5	5	5	0	5

Figures derived from: Scottish Enterprise (2025) Green Data Centres: Approach to Estimating Economic Impact

- 4.30 Under the maximum and low scenarios set out in Table 4.5 above, GVA would be £14.1bn and £1.0bn respectively by 2035.

5 Conclusions and future considerations

Introduction

- 5.1 Based on the findings presented in preceding chapters, summary conclusions are presented here along with some recommendations and considerations for future modelling.

Conclusions from the modelling

- 5.2 The incorporation of AI in economic activity stands to generate considerable additional impact in the Scottish economy. Even under modest scenarios, the impact of AI adoption and implementation of AI infrastructure will be discernible.
- 5.3 For AI adoption (including assumed impacts arising from AI production/services, as discussed above), it is estimated that the following impacts may be realised:
- GDP: AI can potentially increase Scotland's GDP by between **£2.7bn** and **£19.3bn** (+1.3% to +9%) over the null scenario by 2035. Under the *Moderate* scenario, we may see Scotland's GDP rise to almost **£219bn** by 2035.
 - Productivity: Under the *Moderate* scenario, GVA per head across all industries rises by 34% to £95,661 by 2035.
- 5.4 It is estimated that investment in AI infrastructure under the *Medium* scenario will generate a total cumulative net GVA of **£4.5bn** to 2035 (*Low* scenario £1.0bn cumulative GVA; *Maximum* scenario £14.1bn cumulative GVA). This equates to approximately **£5bn** in terms of GDP (based on available Scottish Government national accounts data; for the *Low* and *Maximum* scenarios, this is £1.1bn and £15.8bn respectively). It should be noted that given the differences in methods used to estimate impacts arising from AI adoption and AI infrastructure, the impacts arising from AI infrastructure are presented separately. However, it is reasonable to assume that that these impacts can be considered *in addition to* those impacts for AI adoption set out above (thus approximately a further +2.3% increase).
- 5.5 For comparison, research published by Ofcom suggests that the adoption of broadband connections in the period 2002-2016 contributed to a cumulative GDP increase of 4.34%.³⁵ This suggests that the *Base* and *Moderate* scenarios presented above would be broadly comparable with this GDP increase.
- ### Future considerations for refining AI impact modelling
- 5.6 To develop improved forecasts for the impact of AI on the Scottish economy in future, it is necessary to consider the following:
- There is a need to build on the existing evidence base regarding Scotland's AI landscape and the capability and competitiveness in AI Scotland, and also the wider UK evidence base on AI sector contribution to the UK economy.

³⁵ Koutrompis, K./Ofcom (2018), at: <https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/broadband-research/economic-impact/economic-broadband-oecd-countries.pdf>

- Using (or updating) intelligence from the AI landscape research produced for Scottish Enterprise, it may be worthwhile to develop a taxonomy of AI companies to improve granularity of data regarding companies that operate in AI, and potentially undertake initial research to generate estimates of impact arising from AI services and production.
- Scottish Enterprise should continue to review and identify wider industry intelligence to refine estimates and forecasts.
 - Particular focus should be given to enhancing data granularity.
 - As understanding of the impacts of AI on economic activity increases, it is anticipated that there will be greater availability of retrospective intelligence that will allow rooting of forecasts in actual rather than assumed data.
- One approach to developing greater insight into the impact of AI adoption is to identify firms that have implemented AI solutions and undertake research to generate intelligence to produce estimated impact assessment of AI adoption by Scottish businesses.
- Noting that there is currently a limited number of AI production companies in Scotland, one approach to developing insight into the impact of AI services and production is to build a database of companies registered in Scotland that undertake such activity.
- There is value in continually exploring the ways in which the scenarios included in this analysis may be refined, e.g. to account for different policy levers and interventions as more intelligence becomes available.

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