GLAECONOMICS

The City Data Economy and Artificial Intelligence

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The economic significance of data has increased to the point where "the data economy" is now an integral part of the wider global economy. In London, data is recognised as a valuable asset with a lifecycle spanning gathering, organisation, exchange, and storage, while the data economy comes with its own opportunities and challenges. In this note we set out some definitions useful for understanding the data economy and build on them to summarise the economic potential of data and areas where government at various levels might play a role.

Relatedly, we also briefly review the potential impacts of developments in artificial intelligence (AI) on the wider economy in London.

Data, the Data Economy and the Data Ecosystem

Data can be defined as the representation of a characteristic, action or natural occurrence that conveys information.[1] From an economic standpoint, data has two important characteristics: nonrivalry and partial excludability. Non-rivalry is a term meaning that a good or service can be used simultaneously used by many people without diminishing its availability to others - for instance, a terrestrial TV channel. Partial excludability means that restrictions can be placed on access or usage while permitting others to use it freely - for instance, a subscription streaming service.

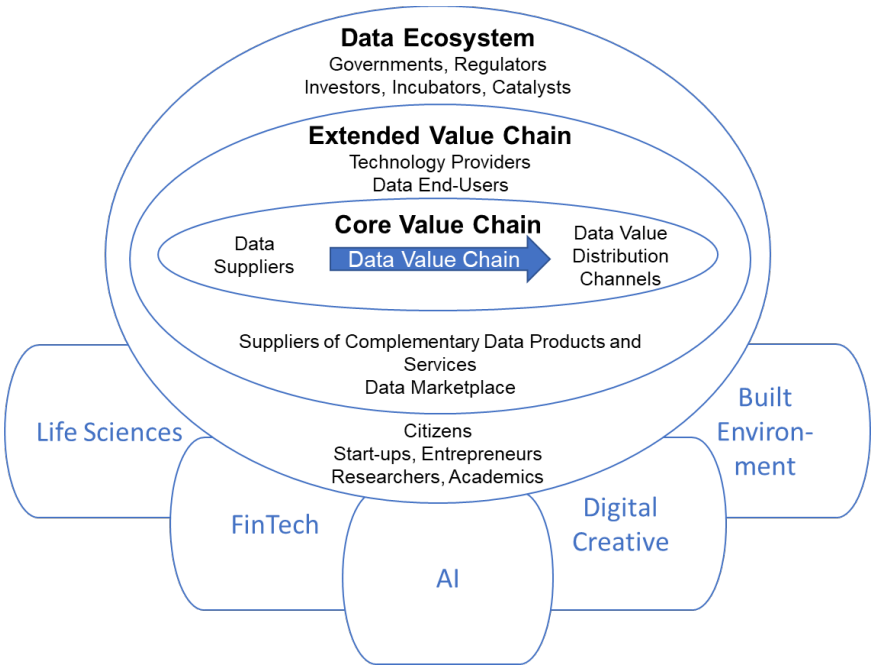
The data economy can be defined as a global digital ecosystem in which various actors gather, organise, and exchange data to create economic value.[2] This value is created at various stages in a data value chain which encompasses data generation, collection, analysis, and monetisation. To measure the impact of the data economy, direct, indirect, and induced effects on the economy must be considered.[3]

A data ecosystem can be defined as a complex socio-technical network that allows data producers, consumers, and governments to explore and create value from data.[4] The dynamics of this network create innovative products, services and solutions within the data economy. Key actors include data suppliers, data end-users, technology providers, data marketplaces, start-ups, entrepreneurs, catalysts, investors, and

[1] El-Dardiry et al., (2021). 'Policy Options for the Data Economy - a Literature Review'. Available at: https://www.cpb.nl/sites/default/files/omnidownload/CPB-Background-Document-Policy-Options-Data-Economy-Literature-Review.pdf
[2] Sestino et al., (2023). 'Decoding the data economy: a literature review of its impact on business, society and digital transformation'. European Journal of Innovation Management.
[3] European Commission communication. (2017). 'Building a European data economy'. Available at: https://digital-strategy.ec.europa.eu/en/library/communication-building-european-data-economy. An alternative schema for understanding the value of the data is presented by Coyle et.al. (2020) https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/Value_of_data_summary_report_26_Feb.pdf
[4] Oliveira et al., (2019). 'Investigations into data ecosystems: a systematic mapping study'. Knowledge and Information Systems, 61, 589-630.

incubators, alongside researchers, academics, and regulatory bodies. These entities interact with each other in the ecosystem. A well-functioning data ecosystem with key stakeholders is illustrated in Figure 1.

Figure 1: Data Ecosystems (Adapted from Curry[5])



There is no single definition of the data sector. However, it generally includes companies and other organisations that directly create value in the data value chain.[6]

Data professionals are workers who primarily collect, store, manage, analyse, interpret, and visualise data. This professional domain can be further classified into two main categories: data technical professionals and data business professionals.[7] Data technical professionals focus on the technical aspects of handling data while data business professionals are involved in leveraging data for strategic business purposes.[8]

The data economy also depends on data infrastructure, comprising assets and services to store, process and transmit data, spanning physical and virtual forms.[9] Examples include databases, cloud services, networking infrastructure, data protection tools, and data centres, among others. Resilient and safe data infrastructure forms the backbone of data economy.[10]

[5] Curry, E. (2016). 'The Big Data Value Chain: Definitions, Concepts, and Theoretical Approaches', in Cavanillas, J. M., Curry, E., and Wahlster, W. (eds) New Horizons for a Data-Driven Economy: A Roadmap for Usage and Exploitation of Big Data in Europe. Springer International Publishing.
[6] Newham Council. (2023). 'We are data.' Available at: https://www.newham.gov.uk/downloads/file/4283/newham-sparks-chapter-2-unleashing-the-power-of-data
[7] European Commission, (2021-2023). Results of the new European Data Market study 2021-2023. Available at: https://digital-strategy.ec.europa.eu/en/library/results-new-european-data-market-study-2021-2023
[8] Ibid.
[9] Department for Science, Innovation &Technology. (2023). 'Protecting and enhancing the security and reliance of UK data infrastructure'. Available at: https://assets.publishing.service.gov.uk/media/657ab6f6254aaa000d050ce2/protecting_and_enhancing_the_security_and_resilience_of_UK_data_infrastructure.pdf
[10] Ibid.

Economic potential and government interventions

The economic impact of data

The data economy makes a significant contribution to economic growth, productivity enhancements, job creation, and cost reduction. Estimates of the size of the data economy vary across different sources, depending on the precise definitions and methodologies used.

The European Commission (EC) estimated the size of the overall data economy, i.e. the overall impact of the data market on the economy as a whole, as €165 billion in the UK in 2023. The Department for Science, Innovation & Technology (DSIT) uses a similar number (it does not cite a source) of 6.9% of GDP in 2022, equating to £157 billion. (It adds that more than three-quarters of UK service exports are data-enabled.)

Meanwhile, the EC report estimates the size of the data market (the value of data exchanged as products or services) in the UK as £24.5 billion in 2023, and the revenues of data companies to reach €39 billion to €52 billion in 2030.[11]

The Institute for Global Prosperity (IGP) at University College, London, indicates a market size of UK open data (that is, data that is freely available) ranging from £41.9 billion to £44.1 billion in 2025 (based on an earlier iteration of the European Commission forecasts). In value-added terms, IGP cites estimates in the range of 0.4%-1.2% of GDP for the contribution of open data.[12]

The number of UK data workers could reach 2.1 million in 2025, according to the European Commission analysis, while demand for data workers rises from 1.8 million in 2020 to 2.2 million by 2025, indicating that a shortfall of data professionals could exist.[13]

In 2030, data professionals are expected to be in the range of 2.6 million to 2.9 million in the UK, and highly concentrated in information & communication, mining, manufacturing, professional services, and retail and wholesale sectors.[14]

In 2030, the number of data supplier companies is estimated to be in the range of 288,000 to 306,000 and the number of data user companies to be in the range of 253,000 to 357,000 in the UK.[15]

Sectors such as Information and Communication, Financial Services, Professional Services and Retail & Wholesale are expected to see the largest growth.[16] The EC suggests that the data ecosystem is developing across 14 sectors: agriculture, culture, energy, finance, green deal, health, language, manufacturing, media, mobility, public administration, research, skills, and tourism.[17]

In FinTech, a noteworthy illustration of this transformation is Open Banking, under which the European Union mandated banks to provide APIs, and which was implemented in 2018 in the UK by the Competition and Markets Authority. This innovation – backed by legislation and regulation - helps mitigate payment

[11] European Commission, (2021-2023). 'Results of the new European Data Market study 2021-2023 (D27 Final report dataset)'. Available at: https://digital-strategy.ec.europa.eu/en/library/results-new-european-data-market-study-2021-2023
[12] Newham Council. (2023). 'We are data.' Available at: https://www.newham.gov.uk/downloads/file/4283/newham-sparks-chapter-2-unleashing-the-power-of-data
[13] European Commission, (2021-2023). 'Results of the new European Data Market study 2021-2023 (D27 Final report dataset)'. Available at: https://digital-strategy.ec.europa.eu/en/library/results-new-european-data-market-study-2021-2023
[14] Ibid.
[15] Ibid.
[16] European Commission, (2021-2023). Results of the new European Data Market study 2021-2023. Available at: https://digital-strategy.ec.europa.eu/en/library/results-new-european-data-market-study-2021-2023
[17] European Commission. (2024). 'Common European Data Spaces'. Available at: https://digital-strategy.ec.europa.eu/en/policies/data-spaces

fraud, eliminates barriers for startups and other industry entrants, and provides consumers with more transparency as well as creates opportunities for companies in new products and services.

In the public sector, data is creating value through transforming services. The open data provided by TfL is estimated to generate up to £130 million of benefits annually.[18] Elsewhere, the European Union is working on connecting and opening data in healthcare, estimating that one third of world's data is produced in this sector. The EU hopes the healthcare data space will create €11 billion of economic benefits in the next decade.[19] However, not all projects are successful. Copenhagen encountered challenges in establishing a city-level public-private data marketplace during the City Data Exchange project in 2016. Key barriers were an immature market, a fragmented data landscape, a reluctance to share data and skills gaps.[20]

The economic impacts of AI

AI is defined as the ability of machines to perform human cognitive functions such as learning, understanding and interacting.[21,22] Since the launch of ChatGPT, the first mainstream generative AI chatbot, in late 2022, public consciousness of the technology has increased and many more industries are making use of it. AI has been widely deployed in service operations optimisation, creation of new AI-based products, customer service analytics, and risk modelling.[23] [24]

Sectors strongly influenced by AI and increasingly requiring AI skills are ICT, professional activities, manufacturing, finance and insurance, education, and wholesale and retail.[25] According to analysis conducted by the GLA Economic Strategy and Innovation team, sectors in London that are propelled by AI include life sciences, financial services, creative industries, and cleantech.[26]

The IMF estimates that about 60% of advanced-economy jobs are exposed to AI, with half of those negatively affected and half positively through complementarities.[27,28] It notes that there are likely to be impacts on income and wealth inequalities – and unlike previous technological changes, displacement could occur among higher-wage earners, although it could also be most complementary to those workers (though not only to those workers). Productivity gains and capital deepening could also deliver income gains across the income distribution. [29,30]

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[18] PWC. (2017). 'The economic impacts of artificial intelligence on the UK economy'. Available at: https://www.pwc.co.uk/economic-services/assets/ai-uk-report-v2.pdf
[19] The Economist Group. (2022). 'The future of Europe's data economy'. Available at: https://impact.economist.com/perspectives/sites/default/files/ei233_msft_futuredata_report_-_v7.pdf
[20] Municipality of Copenhagen and Capital Region of Denmark. (2018). 'City data exchange – Lessons learned from a public/private data collaboration'. Available at: https://cphsolutionslab.dk/media/pages/projekter/data-platforms/city-data-exchange/1837671186-1612174620/city-data-exchange-cde-lessons-learned-from-a-public-private-data-collaboration.pdf
[21] McKinsey & Company. (2023). 'What is AI?'. Available at: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai
[22] European Parliament. (2019). 'Economic impacts of artificial intelligence (AI)'. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI(2019)637967_EN.pdf
[23] McKinsey & Company. (2022). 'The state of AI in 2022—and a half decade in review'. Available at: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2022-and-a-half-decade-in-review
[24] McKinsey & Company. (2023). 'What is AI?'. Available at: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai
[25] OECD. (2023). 'Emerging Trends in AI skill demand across 14 OECD Countries'. Available at: https://www.oecd-ilibrary.org/docserver/7c691b9a-en.pdf?expires=1706608478&id=id&accname=guest&checksum=35BA7BDB1DC02ADC59D3A22AF103C330
[26] GLA Economic Strategy and Innovation team. (In progress). 'Artificial Intelligence and London's Economy Literature review'.
[27] Cazzaniga et al., (2024). 'Gen-AI: Artificial Intelligence and the Future of Work'. Available at: https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2024/01/14/Gen-AI-Artificial-Intelligence-and-the-Future-of-Work-542379?cid=bl-com-SDNEA2024001
[28] Georgieva. (2024). 'AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity'. Available at: https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity
[29] European Parliament. (2019). 'Economic impacts of artificial intelligence (AI)'. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI(2019)637967_EN.pdf
[30] Cazzaniga et al., (2024).

Many studies expect AI to have a significant economic impact through gains in labour productivity and consumer demand for enhanced products. However, it's crucial to recognise that these projections are estimated by commercial institutions and may be subject to exaggeration. According to a Goldman Sachs report (2023), AI could potentially raise global GDP by 7% or £5 trillion over 10 years.[31] PwC predicts a total economic impact of $15.7 trillion globally by 2030. A House of Commons report suggested AI's potential to augment UK's labour market productivity by 25% by 2035.[32]

Supporting AI development and gaining a competitive advantage has become a priority to governments. For instance, the UK's National AI strategy aims to "make Britain a global AI superpower," seeing AI as becoming mainstream in the economy but requiring action to ensure that all sectors and regions can benefit, and that governance and regulation keeps up.[33]

Recent estimates suggest that in the UK there are around 3,000 companies with 120,000 employees that work (at least partly) in the AI field.[34] In the UK, around 15% of businesses are using at least one form of AI.[35] Internal GLA research based on The Data City dataset shows about 1,100 companies in London, mostly with fewer than 10 employees and clustered in the Central Activities Zone.

The GLA Economic Strategy and Innovation team stated that London demonstrates a relatively optimistic outlook, with an estimated net positive impact of 2% on employment. This is largely attributed to the city's robust professional, scientific, technical, and information and communication sectors.[36]

Market failure, government intervention, and policy implications

Policy should create conditions for supporting AI development while addressing potential risks from market failure.[37]

The success of the data economy is not without challenges. As digital platforms amass more data about individuals and other customers, they gain power that can be used in exploitative ways[38, 39]– for instance by predicting behaviour and extracting more of the 'consumer surplus' (the difference between the price charged and the maximum willingness-to-pay of an individual). Privacy concerns and behavioural biases constitute formidable obstacles.[40]

Addressing these challenges could involve interventions such as stronger data protection and privacy regulations, coupled with initiatives to promote public awareness of data risks. Government interventions in this area are fraught because of the positive and negative externalities involved in data sharing, such as the ability of a service-provider using one individual's shared data to extrapolate to other individuals in the same customer segment (for instance to charge higher prices to that group).[41] When this type of externality exists, it can result in excessive data sharing – all individuals end up sharing more information than would be

[31] Goldman Sachs. (2023). 'Potential large effect of AI on Economic Growth'. Available at: https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html
[32] GLA Economic Strategy and Innovation team. (In progress). 'Artificial Intelligence and London's Economy Literature review'.
[33] https://www.gov.uk/government/publications/national-ai-strategy/national-ai-strategy-html-version
[34] Garcia., (2023). 'The AI Economy: National and Regional Insights'. Available at: https://thedatacity.com/blog/the-ai-economy-national-and-regional-insights/
[35] ONS. (2024). Business Insights and Conditions Survey, Wave 98.
[36] GLA Economic Strategy and Innovation team. (In progress). 'Artificial Intelligence and London's Economy Literature review'.
[37] European Parliament. (2019). 'Economic impacts of artificial intelligence (AI)'. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI(2019)637967_EN.pdf
[38] Zuboff, S., 'The Age of Surveillance Capitalism' (2019)
[39] Doctorow, C., '"Enshittification" is coming for absolutely everything', *Financial Times* (2024) available at: https://www.ft.com/content/6fb1602d-a08b-4a8c-bac0-047b7d64aba5
[40] El-Dardiry et al., (2021). 'Policy Options for the Data Economy - a Literature Review'. Available at: https://www.cpb.nl/sites/default/files/omnidownload/CPB-Background-Document-Policy-Options-Data-Economy-Literature-Review.pdf
[41] Ibid.

optimal for consumer welfare. However, if data collection is too heavily regulated, then services might no longer be available even for those individuals who positively view the exchange of their data in return.

Competition-related issues such as information asymmetry and concentrated market power demand careful consideration, and are gaining increasing attention from regulators.[42] The head of the UK Competition and Markets Authority (CMA) recently noted that consolidation of power is evident across various elements of the data and AI economy, from infrastructure to services. The six major tech companies—Google, Microsoft, Meta, Amazon, Apple, and Nvidia—have the capabilities and incentives to shape the AI market in alignment with their own interests.[43] She said that governments need to ensure a fair, open and effective competition for all players to prevent the emergence of a 'winner takes all' scenario within the data and AI economy. The proposed Digital Markets, Competition and Consumers (DMCC) Bill will allow the CMA to designate firms in the broader digital economy as having 'strategic market status' and provide new powers to protect competition.[44] The United States and European Union are also strengthening actions against anti-competitive behaviour, for example forcing unbundling of services, preventing anti-competitive mergers and acquisitions, and imposing standards on access and use of customer data. [45]

While these types of interventions require governmental or supra-governmental action, other harms and market failures can be tackled at a more local level. For instance, equity concerns, such as the 'digital divide' can see local governments play a role by promoting digital literacy, investing in essential infrastructure, encouraging SMEs to adopt AI tools, and subsidising access for underserved populations, particularly at the city level.[46]

If AI becomes widely used, it could lead to a need for stronger skills training for affected workers. As cited above, the IMF estimates that approximately 60% of jobs in advanced economies are exposed to AI, with half facing negative impacts and the other half benefiting from complementarities.[47,48] Those whose jobs are at risk of being automated or replaced by AI might need reskilling, while other workers might need upskilling to take advantage of the opportunities. Public policies can incentivise both formal education and employer training during the AI/data economy transition.[49]

Where data is a public good (whether excludable or not) interventions can ensure the delivery of high-quality data. Local governments can contribute to this by, for instance, taking on the provision of the data or mandating standards for the dissemination of data.

Coordination problems (where all actors in a data value chain would benefit from taking part but are in stasis because one actor is unwilling to do so until another actor does) in data products or services can be

[42] Unlocking digital competition, Report of the Digital Competition Expert Panel (The Furman Report): https://assets.publishing.service.gov.uk/media/5c88150ee5274a230219c35f/unlocking_digital_competition_furman_review_web.pdf
[43] Sarah Cardell. (2024). 'Opening remarks at the American Bar Association (ABA) Chair's Showcase on AI Foundation Models'. Available at: https://www.gov.uk/government/speeches/opening-remarks-at-the-american-bar-association-aba-chairs-showcase-on-ai-foundation-models
[44] CMA (2024). 'Overview of the CMA's provisional approach to implement the new Digital Markets competition regime'. See https://assets.publishing.service.gov.uk/media/659ee36de8f5ec000d1f8b60/20240110_overview_of_digital_markets_regime_-_FINAL_for_publication.pdf
[45] For US FTC guidelines see: https://www.ftc.gov/system/files/ftc_gov/pdf/p859910draftmergerguidelines2023.pdf, for example of unbundling see: https://blogs.microsoft.com/eupolicy/2023/08/31/european-competition-teams-office-microsoft-365/ and for fair data use see: https://digital-strategy.ec.europa.eu/en/policies/data-act#
[46] Azmeh et al., (2021). 'The rise of the data economy and policy strategies for digital development'. Digital Pathways at Oxford Paper Series; no. 10. Oxford, United Kingdom.
[47] Cazzaniga et al., (2024). 'Gen-AI: Artificial Intelligence and the Future of Work'. Available at: https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2024/01/14/Gen-AI-Artificial-Intelligence-and-the-Future-of-Work-542379?cid=bl-com-SDNEA2024001
[48] Georgieva. (2024). 'AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity'. Available at: https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity
[49] OECD. (2024). ' OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market'. Available at: https://www.oecd-ilibrary.org/sites/08785bba-en/index.html?itemId=/content/publication/08785bba-en

mitigated through government funding or leadership. That could take the form of taking a convening role that brings together upstream and downstream partners – for example, data centres, network providers and data-processing businesses – to give each the needed certainty that they will have the customers or suppliers so that they can invest and grow.

Alternatively, in very fragmented data markets, market size might be limited by the lack inter-operability of data products. In that case, a standard-setting role might be helpful in providing the coordination necessary to create growth.

Government bodies at all levels could also participate in building the virtual infrastructure for the data economy. Considerations for the institutional structure include models that address the range of data assets including e.g. registers as well as data itself; standards to curate and provide access; guidance and policies that inform use; organisations that govern the infrastructure; and communities that contribute or are affected by decisions.[50]

Navigating these intricacies is essential to harnessing the full potential of the data economy while ensuring its sustainable and equitable development.

[50] Coyle et.al. `The Value of Data' (2020) https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/Value_of_data_summary_report_26_Feb.pdf

For more information please contact Yiqiao Chen & Nick Jacob, GLA Economics
Greater London Authority, City Hall, Kamal Chunchie Way, London E16 1ZE
Tel: 020 7983 4000 e-mail: glaeconomics@london.gov.uk