The Economic Value of personal data: Balancing the benefits of Digital identities, increased Network Capital and improved Network planning, with the risk of monopolisation by Gatekeepers

Prof. Emanuele Giovannetti

Vice rapporteur ITU-D, Q4.1, Professor of Economics, Anglia Ruskin University and Senior Fellow, Hughes Hall, University of Cambridge

Emanuele.giovannetti@aru.ac.uk

Joint Workshop of Q4/1 and Q6/1 on Personal data usage: regulatory and economic aspects Wednesday, 17 April 2024, 14:30 – 17:30, ITU HQ, Geneva

Introduction

- Large and fast changing personal datasets are key commodities used and traded to add value across many platforms and digital network industries. Their economic value was recently enhanced by Generative AI systems, that use personal data as inputs for algorithmic elaborations, for many different economic purposes.
- As for many other radical innovations, the diffusion of Generative AI systems, has multiple and contrasting effects on existing markets, platforms and industries.
- From a consumer (personal data owner)'s perspective there are clear benefits, that can be derived from the integration and elaboration of its own personal data with others' personal data, especially in terms of visibility/reachability, within a network, suggestion of tailored connections with provider services, usually through profiled adverts across B2C, B2B, or C2C platforms
- However, access to aggregation and elaboration of personal data might create economic rent, monopolisation behaviours, by the companies that use personal data to provide services that become indispensable un unreplaceable.
- Such companies become unavoidable, and their customers may become captured by incredibly high lock-in effects and switching cost , due to the complexities of competition across extremely personalised and tailored services and offers.
- In this presentation, we discuss some of these issues and address related policy recommendations.

Personal data, digital identities and their contribution to "Network Capital"

- In the internet value chain, increased visibility, due to the integration of one's data within the overall network, can help the personal data owners' reachability by other network agents, facilitating data traffic exchanges and increasing network effects (D'Ignazio and Giovannetti, 2014 and 2015). Similarly, visibility, for example enhanced by profiled advertising, can bring benefits by increasing the cross network externalities across two sides of a digital trading platform. (Giovannetti and Siciliani 2020 and 2023).
- Moreover, richer and more complex data analytics, obtained from applying algorithms to the original personal data, may also help in forming and shaping digital identities, whose features can be essential in determining success of failure in digital businesses.
- An particularly relevant example is online crowdfunding. In crowdfunding, the project proposer looking for online funders, publicly displays a digital identity that is often combined with additional publicly visible data, for example relating to the network of funders and supporters of the project proposer. All these original and derived project data, when fed into appropriate algorithms, for example to calculate a project network centrality, contribute to forming the, latent, " Network Capital" of a project.
- Such Network Capital can be used (spent) as a signal of trust associated to a project that can lead to increased funding success through crowdfunding platforms (See Davies and Giovannetti, 2018, based on the Kickstarter and 2022, based on the Kiva platform).

Personal data, Digital infrastructures: Smart meters and the Green Energy Transition.

- Personal user data, available through the digitalisation of the energy grid, via the diffusion of smart meters and their algorithmic elaborations are essential for the integration of renewable energies production and usage into regional energy infrastructures (European Distributed Data Infrastructure for Energy, 2023, Rossetto and Reif, 2021).
- The availability of granular data demand enables grids to better match demand and supply and to incentivise energy demand patterns correlated with sun and wind intensities maps and forecasts (Llorca et al. 2023 & IEA, 2017).
- Hence, the integration, use, and interoperability of personal energy consumption and production data, provide a critical element for the European Green Deal, focusing on delivering the EU's 2030 Climate targets and the Green Energy Transition.

Personal data and lock–in effects

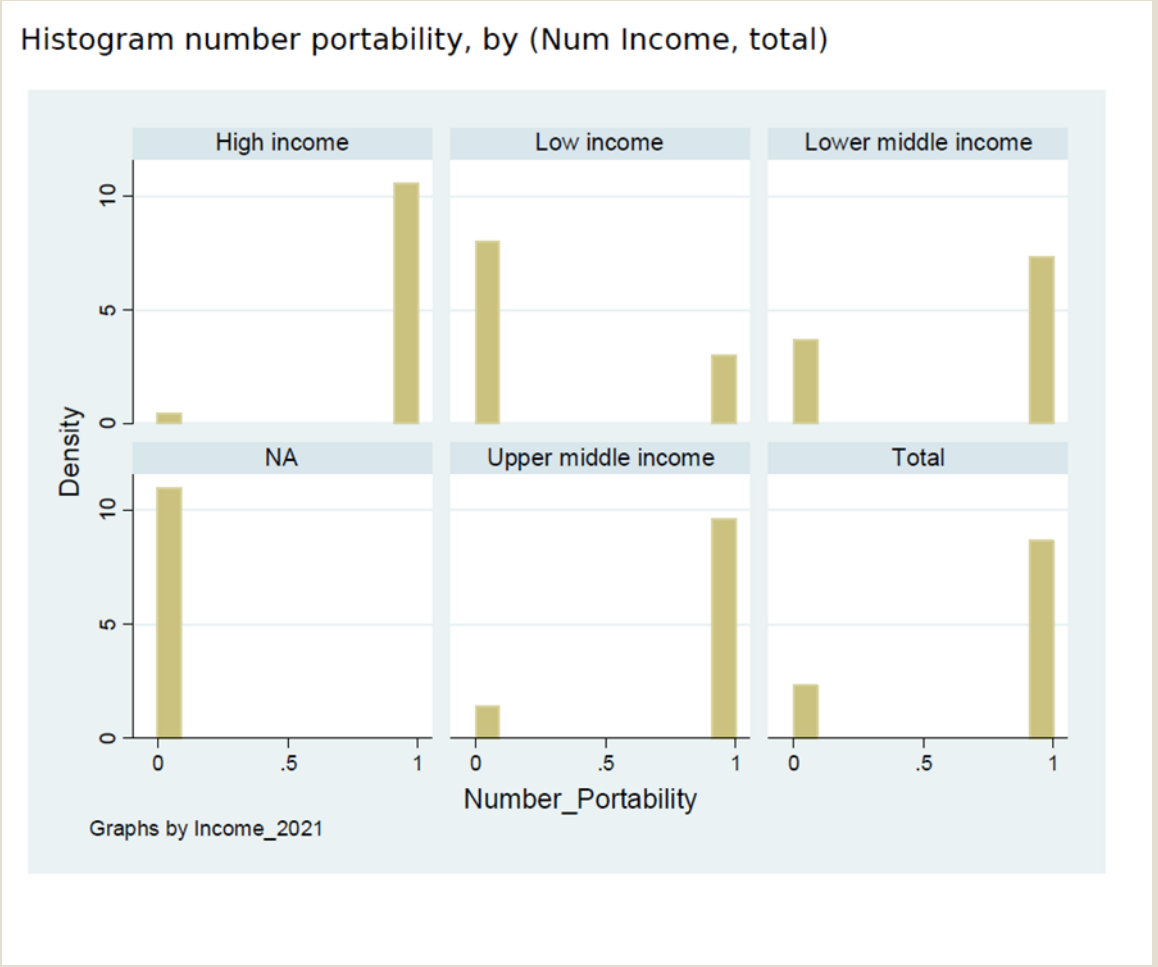
- However, in addition to the increased value for the services provided to the personal data owners, and their essential role in planning, forecasting and managing complex data space/infrastructures with improved efficiencies, the Generative AI system processing of digital personal data also exerts a critical impact on the possibility of entrenching market power for gatekeepers and controllers of network bottlenecks in the digital platform markets.
- Generative AI system outcomes, based on the algorithmic use and interaction of personal and derived/aggregated data, with the internal system parameters, (which are themselves, trained, revised and updated through the personal data, sometimes through Bayesian mechanisms), are used by incumbent Platform and Service providers to supply improved profiled personalized services and ads.
- These , while improving user experience, also introduce lock-in effects and switching costs (Klemperer, 1987), making it more difficult for the original data owner to switch to competing providers, or potential entrants hence creating new barriers to entry into these markets for possible competitors and innovators.

Personal data as entry barrier

- Biglaiser et al. (2019) identified personal data as a possible cause of incumbency advantage since data are fed into algorithms used by the platforms to improve their matching ability for users across the different sides of the platform.
- Typical examples of these advantages are web mapping services, which train their algorithms with information sourced from users' geolocations to provide better-quality services to other users.
- Similarly, search engines develop network centrality metrics (such as PageRank) to build meaningful rankings for search results and targeted advertising. Hence: "If a user has been a client of a platform for some time, the platform knows his or her tastes and can give more prominence to goods or services that he or she prefers. ..the platform can use the data stemming from other users to increase the quality of the service to each of its users" (Biglaiser et al., 2019).
- This might result in reduced innovation and competition, higher prices and reduced quality of service in the long term. (Please note that the notion of long, can be very short, timewise depending on the rapidity of the relevant markets transformations, clearly accelerated by the use of personal data by Generative AI.)

Number portability

- The key antecedent of today's personal digital data was in a customer's telephone number.
- This was traditionally a key personal identifier, allowing its owner to be easily reached by a network of other users, generating positive network externalities (Katz and Shapiro, 1994).
- The larger this network the higher the benefits. Hence, the loss of a personal telephone number, implied the loss of immediate reachability, and costly information to readvertise a changed number, with the consequent loss of benefits from communication, due to a reduced network of immediate peers.
- To address these problems and to facilitate entry into previously monopolized markets, telecom regulators introduced number portability in many countries.



ITU Tariff Survey Data 2021: Elaboration ARU Introduction to Econometrics Module, Class Activity-Live Briefs

Number portability & Internet penetration

- The ITU Data Hub (2022) indicates that nearly 40% of the world countries surveyed have introduced Fixed Number Portability (FNP), "A process by which customers may keep their fixed telephone number when changing either service provider, service or location or both."
- 54% of the world countries requires Mobile number portability (MNP): "A service that allows a mobile service customer to change telecom carrier and keep the same phone number."
- Since by losing a personal number, a consumer would have to spend time to alert all her contacts, as well as several essential service providers (e.g., banking, insurance and utilities), about the changed contact details, number portability was an effective tool in increasing switching activity, especially in mobile markets (Buehler, Dewenter, and Haucap, 2006).

Source	SS	df	MS	Number of obs =
			F(10, 84)	
Model	46963.7988	10	4696.37988	Prob > F
Residual	12005.8448	84	142.926724	R-squared
			Adj R-squared	
Total	58969.6436	94	627.336634	Root MSE

individuals	Coef.	Std. Err.	t	P>t
Num_Income				
Low income	-54.70577	8.532141	-6.41	0.000
Lower middle income	-33.61104	3.999543	-8.40	0.000
Upper middle income	-11.53993	3.377832	-3.42	0.001
number_portability	11.08478	4.48798	2.47	0.016
ITU_Region				
Arab States	24.76405	6.396668	3.87	0.000
Asia & Pacific	20.29704	5.652799	3.59	0.001
CIS countries	24.29557	8.404995	2.89	0.005
Europe countries	19.49371	6.033359	3.23	0.002
Other Economies	25.31116	9.878235	2.56	0.012
The Americas	13.11912	6.133811	2.14	0.035
_cons	60.20958	6.532915	9.22	0.000

ITU Tariff Survey Data 2021: Elaboration ARU
Introduction to Econometrics Module, Class Activity-Live Briefs

From number to personal data portability

- However, due to the convergence of ICTs markets into multiple digital platform markets, and to the variety and type of personal data that Generative AI systems use to provide enhanced services, number portability has become only a small element of the personal data that consumers might need to port to keep their original benefits while changing provider.
- In converged markets, whose offerings are generated through Generative AI systems, the focus should therefore be on reducing the overall "switching costs" faced by consumers to change their provider. This will include the consideration of portability of a full set of personal data, not just number portability.
- Hence, personal data policies require a better understanding of how Generative AI system collect, analyse and integrate these data into digital business models as well as awareness of these processes intended and unintended consequences.
- For example, the consent given to service providers to use one's personal data and to agree to the use of tracking cookies is often granted without much attention, while it can be a
- key element in shaping competition and entrenching market power in the digital markets.

Timing and complexity of porting personal data

- Some experiences of regulatory imposition of wider personal data portability, did not foster switching activity in some service markets. For example, in the UK, the switching of personal current account has been automated since 2014, under the industry-run Current Account Switching Service, which allows consumers to transfer all of their recurring transaction arrangements, both outgoing (e.g., utility bills and mortgage repayments) and incoming (e.g., monthly salary).
- Over the last decade, switching has however increased in other service markets, such as general insurance (e.g., car and home insurance) and retail energy (gas and electricity) even in the absence of regulated data portability.
- One of the differences is the timing of the renewable decision processes, personal current accounts do not renew at regular intervals whereas consumers have to periodically renew their insurance policies and other contracts (e.g., once the fixed-rate promotional period expires (Thaler and Sunstein, 2021).
- However, tariffs and features are constantly reshaped and personalized in real time by Generative AI systems, based on the latest data fed, can be cognitively too costly to be assessed by users, hence higher switching costs.
- Hence, flexibility in the quality and price of supplied services, managed by Generative AI services, is an additional element that can induce success or failure of mandating data portability to address entrenched market power, and network bottlenecks.

Some steps into policies for data portability

- Recently, some countries mandate data portability also to facilitate the comparison of complex tariffs based on a specific usage profile, thus lowering search costs.
- The regulatory advances on these more complex forms of personal data portability/sharing, have been used with the Open Banking Regulation, launched by the UK Competition and Markets Authority, to facilitate tariff comparability and reverse the low level of switching activity in the market for personal current accounts.
- Under this data portability remedy, the largest incumbent banks are required to adopt standardized application program interfaces (APIs) to allow seamless access to user data (with consent) by third-party apps.
- Deloitte (2023) explores the state of Open Banking across the world identifying two alternative approaches: market driven experiences, among which: Singapore, Japan, USA, and regulatory-driven ones, EU, UK, Hong Kong and Australia.
- Interestingly, the report identifies the wider scope of Australia's Consumer Data Right Act (CDR), that will allow consumers to share their data with any authorized third parties, without being restricted to financial services, becoming an overall data policy that will apply to the energy and telecommunication sectors as well.

The interaction of network effects and lock in cost

- The approach to data portability adopted with Open Banking is often seen as an example for regulatory intervention for wider digital platforms markets (e.g., Gans, 2018; Coyle, 2019; and Scott Morton et al., 2019).
- In these markets, an incumbency advantage is often strengthened by the presence of network effects, both within the same category of users (i.e., direct network effects – e.g., connecting with social peers) and across separate ones (i.e., indirect network effects under multi-sided platform competition – e.g., e-marketplace).
- Switching costs and network effects feed off each other to sustain the incumbency advantage.
- This can be especially the case where the same platform provides a bundle of personalized services that hinges on the creation of a shared, detailed and multifaceted users' identities and preferences, often with the use of trackers run by a few Big Tech firms (OECD, 2020).
- Similarly to switching costs, network effects also can give rise to a first-mover advantage due to the belief that the challenger platform might fail to reach a viable scale.
- In these cases, data portability is allowing entrants into the platform markets to match the quality of the incumbent's Generative AI based match-making service: ported data can improve the matching/predictive algorithms.

The amalgamation between personal and others data

- The key problem in defining the scope of relevant personal data portability, is the fact that the attributes of a digital identity are not only the reflection of the original data inputs provided by the user, but also the results of Generative AI inferences obtained from proprietary algorithms and statistical aggregation.
- For example, location services, browsing histories, site reviews, dedicated advertising, driving directions, are all different tailored services based on Generative AI based profiling relying on personal data gathered through tracking methods.
- Therefore, changing platform could entail a deterioration of the relevance in these personalized services. Arguably, this new type of 'lock-in effect' increases the longer the customer relationship with the platform in question has been in place.
- To deal with some of the implications for competition posed by the competitive value of personal data through algorithms and aggregation, the EU Digital Markets Act (DMA) states that once gatekeepers' platforms are identified, they will be prohibited from amalgamating personal data from different services, prevented from using data collected from third-party merchants to engage in competitive practices against them, and obligated to allow users to download apps from rival platforms.

Unavoidability

- Moreover, it is essential for policy considerations to note that digital platforms have different degrees of *unavoidability* in a networked market, due to their Network centrality (D'Ignazio & Giovannetti 2006 and 2014).
- These centralities are the key metrics to assess a provider's network relevance, or being considered a gatekeeper, as they capture more appropriately entrenched market power, than the traditionally used metrics of market shares, since these have a vague definition within complex digital ecosystems markets.
- In these markets boundaries are dynamically reshaped though the establishment of network links, through Generative AI newly established relationships among the different ecosystem players.

AI and heterogeneity of switching costs

- Last but not least, not only gatekeepers network centralities vary in digital ecosystem markets, possibly leading to ecosystemic tipping effects, but, on the demand side, the switching costs due to the profiling from Generative AI systems use of personal data can also be very different for different users.
- These different degrees of switching costs, may reflect differences in knowledge, time availability, cognitive and behavioural differences in users, when dealing with complex choices across multi-dimensional, personalized contracts, services and tariffs supplied through Generative AI systems.
- Hence, Generative AI systems introduce an additional regulatory complication as they increase heterogeneity in switching costs both across users on one side of a digital platform, for example sellers and buyers, and in-between users within each one of the two sides.
- This is captured in Giovannetti and Siciliani (2023) who developed a singlehoming model to assess the incumbency advantage among two-sided platforms whereby agents have different switching costs within and between sides.
- In this case, regulatory intervention aimed at reducing switching cost for the most vulnerable users, those more locked-in with the current provider, might also undermine the entrant's prospect to gain a sustainable foothold in the market, because the incumbent responds to the reduction in switching costs by setting lower prices, squeezing out the entrant.

Recommendations

Given the conflicting evidence and results on the impact of the usage of Generative AI systems of personal digital data in the digital ecosystem markets, relevant regulatory and competition authorities' assessment of the impact of the collection and analysis of personal digital data by Generative AI systems, should consider each of these often-conflicting dimensions:

a) The beneficial impact on the visibility and digital identities of the data originators.
b) The systemic efficiencies they bring in the management, planning and forecasting of digital infrastructures and.
c) The economic impact on the competitive landscape, due to the economic rent that providers might derive from being able to access, process, transform and use these digital data, whereby this might create new barriers to entry and competition into these platform markets, for example by allowing the use of Generative AI system to implement data-based price and quality discrimination of services.

Conclusions

- There is a large literature and guidelines on infrastructure cost sharing (ITU 2021).
- This is usually relating to the regulation of interconnection costs and agreements across physical active and passive Telcom infrastructures.
- Due to the convergence and to the disruptive role of Generative AI, digital platforms and networks based on trading services whose main input is provided by the usage of personal data services should also be considered as shared infrastructures, and their governance, modality, interoperability, access costs, should be considered through similar lenses as those for physical infrastructures.
- The only challenge being that they change more rapidly, than regulatory decisions times.
- Hence the apriori identification of gatekeepers and ex ante regulation of their behavioral boundaries should be considered to avoid chasing goalpost that have already moved.

References

Buehler,S., R. Dewenter, J. Haucap (2006), "Mobile number portability in Europe", Telecommunications Policy, 30, 385-399.

Coyle, D. (2018), "Practical competition policy implications of digital platforms", Antitrust Law Journal, 82, 835-860.

Davies, W. E. and Giovannetti, E. (2018). Signalling experience & reciprocity to temper asymmetric information in crowdfunding evidence from 10,000 projects. *Technological Forecasting and Social Change* Volume 133, August 2018, Pages 118-131

Davies, W. E. and Giovannetti, E. (2022). "Latent Network Capital and Gender in Crowdfunding: evidence from the Kiva platform". *Technological Forecasting and Social Change;* Volume 182, September 2022.

Deloitte Open Banking around the world Towards a cross-industry data sharing ecosystem, (2023) https://www2.deloitte.com/tw/en/pages/financial-services/articles/open-banking-around-the-world.html

D'Ignazio, A. and Giovannetti, E. (2006) "Antitrust Analysis for the Internet Upstream Market: A Border Gateway Protocol Approach" *Journal of Competition Law & Economics*, Volume 2, Issue 1, pp. 43-69.

D'Ignazio, A. and Giovannetti E. (2015) "Predicting Internet Commercial Connectivity Wars: the Impact of Trust and Operators Asymmetry" *International Journal of Forecasting* Volume 31, Issue 4, October–December 2015, Pages 1127–1137.

D'Ignazio A. and Giovannetti E. (2014) "Continental Differences in the Clusters of Integration: Empirical Evidence from the Digital Commodities Global Supply Chain Networks" *International Journal of Production Economics*, Volume 147-B, pp 486–497.

European Distributed Data Infrastructure for Energy, (2023), EDDIE https://eddie.energy/about Accessed on 9 October 2023

Gans, J. (2018), "Enhancing Competition with Data and Identity Portability", The Hamilton Project, Brookings, available at https://www.brookings.edu/wp-content/uploads/2018/06/ES_THP_20180611_Gans.pdf

Giovannetti, E. and Siciliani, P. (2020) "The Impact of Data Portability on Platform Competition" Antitrust Chronicle, Fall 2020, Volume 2, Number 2

Giovannetti, E., & Siciliani, P. (2023). Platform Competition and Incumbency Advantage under Heterogeneous Lock-in effects. *Information Economics and Policy*, 101031.

IEA (2017), Digitalisation and Energy, IEA, Paris https://www.iea.org/reports/digitalisation-and-energy

International Telecommunication Union, ITU DataHub, (2022) https://datahub.itu.int/. Accessed, 8 October 2023.

Katz, M.L. and Shapiro, C. (1994). "Systems competition and network effects". *Journal of economic perspectives*, 8(2), 93-115.

Klemperer, P. (1987). "Markets with consumer switching costs". *The Quarterly Journal of Economics*, 102(2), 375-394.

Llorca M., Soroush, G., Giovannetti E., Jamasb T., Davi-Arderius D. (2023). "Digitalisation and Economic Regulation in the Energy Sector", forthcoming in the Forsyningstilsynet (Danish Utility Regulator) Anthology on better regulation in the energy sector

Llorca, M., Soroush, G., Giovannetti, E., Jamasb, T., & Davi-Arderius, D. (2024). Energy Sector Digitalisation, Green Transition and Regulatory Trade-offs (No. 5-2024). Copenhagen Business School, Department of Economics.

OECD (2020), "Consumer Data Rights and Competition - Background note", available at https://one.oecd.org/document/DAF/COMP(2020)1/en/pdf

OECD (2021), *Data Portability, Interoperability and Digital Platform Competition*, OECD Competition Committee Discussion Paper, http://oe.cd/dpic

Rochet, J.C. and Tirole, J. (2003). "Platform competition in two-sided markets". *Journal of the European Economic Association*, 1(4), 990-1029.

Rossetto, N., Reif, V., (2021) Digitalization of the electricity infrastructure : a key enabler for the decarbonization and decentralization of the power sector, EUI RSC, 2021/47, Florence School of Regulation, [Electricity] - https://hdl.handle.net/1814/70736

Scott Morton, F., P. Bouvier, A. Ezrachi, B. Jullien, R. Katz, G. Kimmelman, A.D. Melamed and J. Morgenstern (2019), Committee for the Study of Digital Platforms - Market Structure and Antitrust Subcommittee, Report, George J. Stigler Center for the Study of the Economy and the State, available at https://www.judiciary.senate.gov/imo/media/doc/market-structure-report%20-15-may-2019.pdf

Thaler, R. H., & Sunstein, C. R. (2021). *Nudge: The final edition*. Yale University Press.