INDUSTRY DYNAMICS IN DIGITAL MARKETS

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Abstract. With the diffusion of digital technologies, digital markets are gaining prominence. The industry dynamics in these markets are shaped by the interaction of three phenomena: the emergence of new business models, the relevance of network effects, and the possibility to cheaply collect and use data about market participants. This special issue enriches our understanding of these dynamics by investigating the three above-outlined phenomena from various perspectives. In this introductory essay, we summarise the contributions of the eight papers hosted in the issue and outline future research avenues.

Introduction

Digital technologies reduce the storage, computation, and data transmission costs (Goldfarb and Tucker, 2019). This has a tremendous impact on the organisation of economic activity and brings into prominence digital markets, i.e. places where digital technologies are used to exchange goods, services, and information. Digital markets are often organised around platforms (see Gawer, 2014; Kenney and Zysman, 2016), i.e. intermediaries that 'bring together individuals and organizations so they can innovate or interact in ways not otherwise possible' (Cusumano et al., 2019: 13). Such platforms have spread in many contexts and have transformed entire industries (Cabral et al., 2019).

Digital markets are characterised, among others, by three distinctive aspects. First, digital technologies enable the emergence of new business models and new ways to create value-added. For instance, traditional businesses tend to generate profits by converting inputs into outputs, while platforms do so by coordinating distinct groups of agents (Evans and Schmalensee, 2016). This impacts how competitive dynamics affect digital markets, as opposed to traditional ones. Second, network effects play a primary role in digital markets (see Evans, 2003; Rochet and Tirole, 2003; Armstrong, 2006): the benefits enjoyed by one side of the market (e.g. buyers) are contingent on the size and the relevant characteristics of

the other sides that are active in that same market (e.g. sellers). Hence, intermediaries and participants in digital markets strive to leverage network effects, which thus shape industry dynamics in these markets. Third, digital technologies facilitate the gathering, storing, and processing of amounts of information that a decade ago would have been unthinkable. Such data can be analysed and used to increase the value of transactions (e.g. by tailoring products to customers' needs) and strengthen one's position in a market.

The eight articles selected for the special issue extend our knowledge of the industry dynamics in digital markets by tackling the three aspects mentioned above: the creation of new business models enabled by digital technologies, the role of network effects, and the increased access to big data. In the remainder of this essay, we highlight the authors' contributions and conclude by proposing some avenues for future research.

The emergence of new business models enabled by digital technologies

Many scholars have focused on the platform business model and have examined competition issues between platforms (Kretschmer et al., 2022) and across them (Anderson et al., 2019; Bryan and Gans, 2019; Casadesus-Masanell and Campbell, 2019; Halaburda and Yehezkel, 2019; Karle et al., 2020). Instead, research has almost neglected the appearance within traditional industries of new business models enabled by digital technologies (Chang and Sokol, 2022, being a notable exception). Yet, introducing new business models typically disrupts existing incumbents' revenue streams and balance of power (Kretschmer et al., 2022). It thus deserves more attention in future studies. In this issue, Fanti, Guarascio and Moggi (2022), Grassi and Lanfranchi (2022) and Pelagidis and Kostika (2022) make a step to fill this gap.

Fanti, Guarascio and Moggi (2022) explore the development of Artificial Intelligence (AI) and its impact on business models, organisation, and work. They provide a stylised history of AI showing how the latter evolved from being a purely academic-scientific field to a mostly corporate-dominated domain characterised by a strong concentration of technological and economic power. They also show how the development and diffusion of AI are giving new strength to the lean-production paradigm - in both manufacturing and service sectors - by contributing to establishing a new 'digital Taylorism'.

Grassi and Lanfranchi (2022) conduct a systematic literature review on RegTech, i.e. the application of technology-enabled innovations for regulatory, compliance, and reporting

requirements. To organise the results of prior studies, they develop a conceptual framework composed of four building blocks, namely i) RegTech relations with regulation and technology, ii) the emerging role of data, iii) the stakeholders (regulated entities and regulators) and the associated applications and iv) the benefits and risks that stakeholders can achieve.

Finally, Pelagidis and Kostika (2022) examine digital markets in the financial industry. They show that in recent years there has been increasing usage of digital payments in the Euro area and significant spillovers exist between novel blockchain-based assets (e.g. cryptocurrencies and stablecoins) and traditional financial assets. The empirical analysis indicates that this phenomenon caused the European Central Bank to issue a central bank digital currency in the Eurosystem's payment landscape.

The relevance of network effects

While network effects have received significant attention in the industrial organisation, technology management, and strategy literature (McIntyre and Srinivasan, 2017), and they have been explored in recent special issues (Nambisan et al., 2019; Ciarli et al., 2021; Spiegel and Waldfogel, 2021; Kretschmer et al., 2022), a lot remains to be analysed and understood about the implications of network effects for industry dynamics. For instance, our understanding of how network effects shape acquisition and collaboration strategies in digital markets and their performance implications is still limited.

Brutti and Rojas (2022) and Wai (2022) look at the implications of network effects for industry dynamics, respectively from a managerial and a policy perspective.

Brutti and Rojas (2022) start from the premise that merger and acquisition (M&A) policy shapes the early investment incentives of platform startups and thereby affects the welfare of consumers in the platform ecosystem. They analyse the issue theoretically by categorizing the investment decisions of digital transaction platforms' into two main dimensions: customer base expansion and transaction cost reduction. They model how the investment decisions of new transaction platforms are shaped by antitrust rules allowing or restricting M&A in platform ecosystems. They show that the M&A policy that maximises platform-users' surplus depends on i) the extent of overlap between the target users of incumbent and entrant platforms and ii) the ability of entrant platforms to catch up with the competitive advantage of incumbent platforms. Specifically, when platforms appeal to separate customer bases (i.e. they are not competitors), a permissive M&A regime provides new entrants with incentives to

direct their investments towards expanding the user base rather than investing in lowering operational costs. Indeed, in case of acquisition, entrant platforms will benefit from technology transfers from the acquirer and allowing M&A maximises users' surplus. Conversely, when platforms compete for the same customers, a permissive M&A regime gives entrants the incentive to improve bargaining power during negotiations with incumbents. Hence users benefit from having M&A restricted. The framework further reveals that when entrants make investment decisions before knowing whether they will be in direct competition for users with incumbents, allowing M&A activity is optimal in those contexts in which the technology advantage of the incumbent is large, as the prospect of an M&A acts as an insurance device for startups.

Wai (2022) focuses on indirect network effects. His empirical analysis concentrates on the video game console industry. It examines the impact of the quality of complementors (i.e. video games) on the number of platform users (i.e. sales of consoles). In doing so, he develops novel measures of complementor quality based on professional reviews. Complementors in the video game console industry may be backward-compatible, so quality measures distinguish the quality of current-generation complementors and backward-compatible complementors. The findings of a positive relationship between software quality and console sales, along with the weaker effect of the quality of backward-compatible software compared to the one of current-generation software, support the theoretical argument that indirect network effects increase the value of a platform to users when the variety and quality of available complementors are greater.

The possibility of cheaply collecting and using data

The possibility to cheaply record and analyse huge amounts of data on the characteristics and preferences of participants in digital markets may generate competitive advantages for some firms operating in these markets. This raises interesting research questions; for instance, scholars may investigate the optimal information acquisition strategy (including information design to maximise consumers' willingness to provide feedback on their experiences). For a review, see Tadelis (2016); for how to manage privacy regulation, see Montes, Sand-Zantman, and Valletti (2019).

In this special issue, D'Annunzio and Menichelli (2022), Padilla, Piccolo and Vasconcelos (2022), and Pino (2022) lie in the field of data economics and investigate the research theme from the perspectives of the platform, the final user, and the policy maker, respectively.

D'Annunzio and Menichelli (2022) study the trade-off consumers face between monetary benefits and personal data disclosure. Their approach distinguishes between the willingness to pay to keep individual data private and the willingness to share data in exchange for a discount, measuring them on a Likert-type willingness scale. They find that the propensity level to share data is higher than the propensity level to pay for low-sensitivity data, such as age. Instead, the relation is reversed for sensitive data, such as pictures. They also analyse the determinants of these two propensity levels, finding that the willingness to share increases when the data are used for personalisation and when users interact with institutions they trust. Also, the willingness to pay for privacy is higher when services are provided by financial institutions and mobile operators.

Padilla, Piccolo, and Vasconcelos (2022) show that the business model under which a platform operates affects the accuracy of the consumer information collected by a platform. They compare the platform's incentives to acquire information under two models, one in which the platform is a pure intermediary that connects buyers and sellers, and a hybrid one in which the platform also introduces its private label to compete with third-party sellers. They find that the ranking across the two business models in terms of the amount of information acquired depends on the intensity of intra-platform competition and its bargaining power vis-à-vis third-party sellers. Their results explain the heterogeneity in consumers' privacy protection across platforms with different business models and carry important policy and regulatory implications on regulating platforms with different business models.

Pino (2022) surveys the literature on the welfare and competitive effects of data collection and use. He identifies several cases, depending on both the data effects and the strategic interactions in the market for data collection, including its vertical organisation (i.e. presence of data intermediaries or attention platforms). The paper provides general insights that can facilitate future research and help policymakers have a broader understanding of the competitive effects of data, depending on the situation.

Future research avenues

The literature on digital markets, both empirical and theoretical, has mainly analysed existing digital markets, that is, markets in sectors and areas that the digital revolution has hit. These markets are a selected sample: not all product and geographic markets are equally open to new technologies, and those that adopted them first are not random. In addition, existing

digital markets are typically young and non-mature. This severely limits the generalisability of the results and the managerial and policy implications that can be drawn from them. A significant task for the literature ahead will be investigating and anticipating the effects of digitalisation in markets that will be affected by the digital revolution in the future. One example of anticipation of the impact could be that of land exploitation. The construction and agricultural sectors have not yet been directly affected by the digital revolution, but the real estate industry is now experiencing it. Using blockchain technology, it is now possible to partition the ownership of real property using non-fungible tokens (NFT). This will likely have consequences on the construction sector and, hence, on land use. Digital markets may also impact the agricultural sector by facilitating direct sales without intermediaries. This will likely affect competition because small and large producers will then compete against each other.

Another path to improve generalisability consists in analysing whether the current literature on digital markets applies to markets in emerging or developing countries and in more mature industries. For instance, we know that mature markets follow particular patterns that differ from young markets (Agarwal et al., 2002). What shall we then expect from digital markets once they become mature? Similarly, digital markets have currently flourished primarily in sectors in which agents themselves are relatively young. But, even in technologically-advanced countries, the digital divide across generations is substantial. Will the same patterns emerge even when digitalisation reaches sectors where most agents are unfamiliar with new technologies? Finally, how will traditional and digital markets interact? For instance, Piolatto and Schuett (2022) explore the consequences of competition when firms simultaneously compete through a platform and offline. They suggest that on- and off-line markets can sometimes complement each other nicely, but generally the welfare effect is ambiguous. Boffa, Fedele, and Iozzi (2021) analyse the interaction between conventional and autonomous vehicles operated by a fleet. They find that the fleet reacts to congestion differently than conventional vehicles, and welfare effects are ambiguous. In general, more work on ways in which online and offline serve different purposes and find their niche (or complement each other) is warranted. In this vein, research on the role of the public sector in ensuring those services (for example, should platforms in the transport sector be operated as public transport?), as well as on the forms of optimal taxation in digital markets would also be welcomed.

Digital markets also require revisiting traditional literature on competition policy and regulation. While some important work has been done already (see, for instance, Franck and

Peitz, 2019, for a review), there remain open questions, for example, how to define the relevant market (for competition policy) when a platform has no physical location (or its location can move quickly to locate in the most favourable place). The recent approval by the Commission of the Digital Markets Act and the Digital Services Act will likely stimulate more research on the definition and the obligations for platforms classified by the Acts as 'gatekeepers'. One of them, for instance, consists in sharing the data with rival platforms. This involves a trade-off between the enhancement of competition on the one hand, and the entrenchment of market power along with the decrease of the incentives to innovate/collect data on the other hand. Data collection increases platforms' ability to raise revenue from advertising. The interaction between product and advertising markets becomes prominent and may command the regulator's attention. Advertising markets may be more competitive than product markets, which raises the question of whether dominant platforms leverage market power from product markets to advertising markets.

References

Agarwal, A., Sarkar, M.B., & Echambadi, R. (2002). The conditioning effect of time on firm survival: an industry life cycle approach. Academy of Management Journal, 45(5), 971-994.

Anderson, S.P., Foros, Ø., & Kind, H.J. (2019). The importance of consumer multihoming (joint purchases) for market performance: Mergers and entry in media markets. Journal of Economics & Management Strategy, 28, 125–137.

Armstrong, M. (2006). Competition in two-sided markets. The RAND Journal of Economics, 37(3), 668–691.

Boffa, F., Fedele, A., & Iozzi, A. (2021). Congestion and Incentives in the Age of Driverless Fleets, mimeo.

Brutti, Z., & Rojas, L. E. (2022). M&A and early investment decisions by digital platforms. Journal of Industrial and Business Economics, this issue.

Bryan, K. A., & Gans, J. S. (2019). A theory of multihoming in rideshare competition. Journal of Economics & Management Strategy, 28(1), 89-96.

Cabral, L., Peitz, M., & Wright, J. (2019). Introduction to the special issue on platforms. Journal of Economics & Management Strategy, 28(1), 3-4.

Casadesus-Masanell, R., & Campbell, N. (2019). Platform competition: Betfair and the UK market for sports betting. Journal of Economics & Management Strategy, 28(1), 29-40.

Chang, H., & Sokol, D. (2022). How incumbents respond to competition from innovative disruptors in the sharing economy – The impact of Airbnb on hotel performance. Strategic Management Journal, 43(3), 425–446.

Ciarli, T., Kenney, M., Massini, S., & Piscitello, L. (2021). Digital technologies, innovation, and skills: Emerging trajectories and challenges. Research Policy, 50(7), 104289.

Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). The business of platforms: Strategy in the age of digital competition, innovation, and power (pp. 1-309). New York: Harper Business.

D'Annunzio, A., & Menichelli, E. (2022). A market for digital privacy: consumers' willingness to trade personal data and money. Journal of Industrial and Business Economics, this issue.

Evans, D. S. (2003). Some empirical aspects of multi-sided platform industries. Review of Network Economics, 2(3), 191–209.

Evans, D. S., & Schmalensee, R. (2016). Matchmakers: The new economics of multisided platforms. Harvard Business Review Press.

Fanti, L., Guarascio, D. & Moggi, M. (2022). From Heron of Alexandria to Amazon's Alexa: a stylized history of AI and its impact on business models, organization and work. Journal of Industrial and Business Economics, this issue.

Franck, J. U., & Peitz, M. (2019). Market Definition and Market Power in the Platform Economy, CERRE Report, May 2019.

Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. Research Policy, 43(7), 1239-1249.

Goldfarb, A., & Tucker, C. (2019). Digital economics. Journal of Economic Literature, 57(1), 3-43.

Grassi, L., & Lanfranchi, D. (2022). RegTech in public and private sectors: the nexus between data, technology and regulation. Journal of Industrial and Business Economics, this issue.

Halaburda, H., & Yehezkel, Y. (2019). Focality advantage in platform competition. Journal of Economics & Management Strategy, 28(1), 49-59.

Karle, H., Peitz, M., & Reisinger, M. (2020). Segmentation versus agglomeration: Competition between platforms with competitive sellers. Journal of Political Economy, 128, 2329–2374.

Kenney, M., & Zysman, J. (2016). The rise of the platform economy. Issues in Science and Technology, 32(3), 61.

Kretschmer, T., Leiponen, A., Schilling, M., & Vasudeva, G. (2022). Platform ecosystems as meta-organizations: Implications for platform strategies. Strategic Management Journal, 43(3), 405-424.

McIntyre, D. P., & Srinivasan, A. (2017). Networks, platforms, and strategy: Emerging views and next steps. Strategic Management Journal, 38(1), 141-160.

Montes, R., Sand-Zantman, W., & Valletti, T. (2019). The value of personal information in online markets with endogenous privacy. Management Science, 65(3), 1342-1362.

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. Research Policy, 48(8), 103773.

Padilla, J., Piccolo S., & Vasconcelos, H. (2022). Business models, consumer data and privacy in platform markets. Journal of Industrial and Business Economics, this issue.

Pelagidis, T., & Kostika, E. (2022). Investigating the role of Central Banks on the interconnection between financial markets and cryptoassets. Journal of Industrial and Business Economics, this issue.

Pino, F. (2022). The microeconomics of data – a survey. Journal of Industrial and Business Economics, this issue.

Piolatto, A., & Schuett, F. (2022) Information vs Competition: How Platform Design Affects Surplus and Profit. BSE Working Paper 1325.

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

Spiegel, Y., & Waldfogel, J. (2021). Introduction to the special issue of information economics and policy on "antitrust in the digital economy". Information Economics and Policy, 54, 100894.

Tadelis, S. (2016). Reputation and feedback systems in online platform markets. Annual Review of Economics, 8, 321-340.

Wai, S. (2022). Software quality and backward compatibility in the video game industry. Journal of Industrial and Business Economics, this issue.