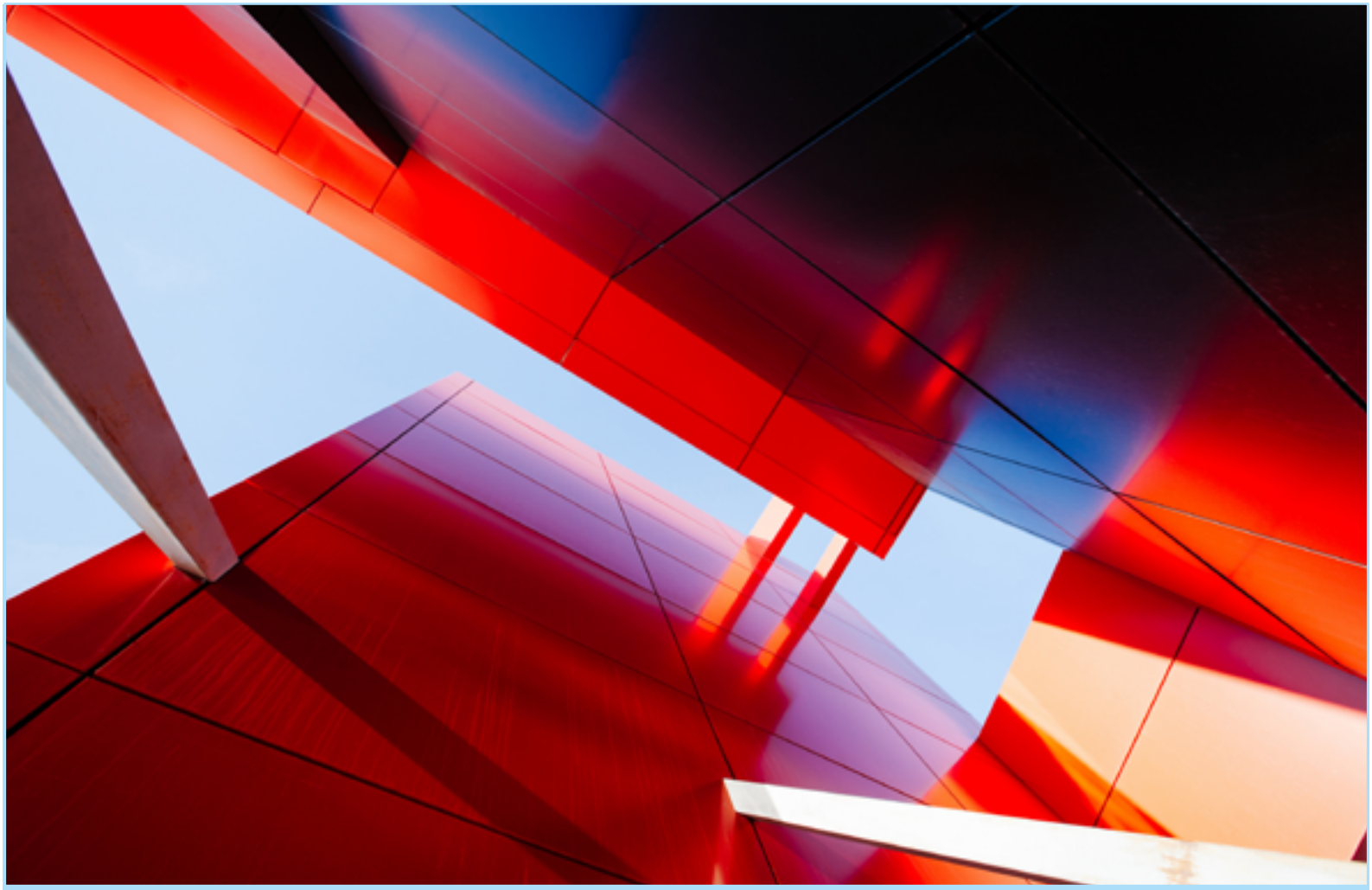

REGULATING DIGITAL PLATFORMS: **BUSINESS MODELS, TECHNOLOGY ARCHITECTURES, AND GOVERNANCE RULES**

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Regulating Digital Platforms: Business Models, Technology Architectures, and Governance Rules

By Panos Constantinides

In recent years, digital platforms like Facebook, Apple iOS and the Amazon Marketplace have grown so big that they have attracted a lot of scrutiny by regulators in regards to their market power. The recent European Digital Markets Act focuses exactly on the market power of these digital platforms by defining a set of criteria for qualifying such platforms as so-called "gatekeepers." For some analysts and commentators such gatekeeping is reminiscent of the gatekeeping exercised by more traditional utility infrastructures and that, we should, therefore apply similar policies to regulate digital platforms. In this short article, I will discuss where earlier regulation applies to, but also where it becomes highly problematic for, digital platforms. I will conclude with some recommendations going forward.

01

INTRODUCTION

Platforms are based on open innovation and the realization that no internal R&D can ever match innovation that happens outside a firm's boundaries. Physical product platforms such as airplanes, cars and computer hardware have been around for many decades, enabling different complementors and their supply chains to contribute components and collectively develop stronger value propositions across broader ecosystems. By developing products on a platform (e.g. the Windows-Intel platform), complementors benefit from innovation spillovers, economies of scale and scope while also mitigating some of the risks of innovating on their own.[1]

Such innovation is very much dependent on modular components and standardized interfaces, which help to reduce technological complexity and increase flexibility.[2] Standardized interfaces capture each modular component's unique features, while at the same time enabling interdependencies between them. In this way, platforms can be developed through bundled components, from which varied products and services can be generated to achieve user differentiation across ecosystems.

Whereas non-digital platforms are nested and fixed to a product hierarchy (e.g. a gearbox is tied to car model), digital platforms can be product agnostic and generative.[3] For example, platforms such as, Netflix and YouTube can be integrated on Android and iOS, as well as the operating systems of multiple TV models; applications such as Google Maps can be integrated into car entertainment systems and even become components on other digital platforms such as Booking.com and Airbnb.[4] The product agnosticism of digital platforms can entail contributions by heterogenous complementors that can constantly bring about new value propositions and, thus, generate even more network effects and market concentration.[5]

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For the big firms that orchestrate these digital platforms, controlling interactions between these various complements through application programming interfaces ("APIs") means that they also have access to a myriad of data points about customers, competing products and services that they can use to benchmark their own apps, as well as to self-preference those.[6] Thus, these big firms are no longer just orchestrators of a single platform but rather orchestrators of multi-product and multi-actor ecosystems.[7] It is exactly this increased market concentration that has spurred discussions around whether *ex ante* regulation should supplement current *ex post* competition law on digital platforms.[8] *Ex ante* regulation consists of a set of sector-specific, structural rules for organizing market activities, whereas

1 Gawer, A. & Cusumano, M.A., 2002. *Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*. Boston, MA: Harvard Business School Press.

2 Baldwin, C.Y. & Clark, K.B. (2000). *Design Rules – The Power of Modularity*, Cambridge, MA: MIT Press; Schilling, M.A. (2000). Towards a General Modular Systems Theory and its Application to Interfirm Product Modularity, *Academy of Management Review* 25(2): 312–334;

3 Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research*, 21(4), 724-735.

4 Constantinides, P., Henfridsson, O. & Parker, G.G., 2018. Platforms and infrastructures in the digital age. *Information Systems Research*, 29(2), pp. 381-400.

5 Parker G.G., Van Alstyne M.W. &Choudary S.P. (2016) *Platform Revolution: How Networked Markets are Transforming the Economy and how to Make Them Work for You.* W. W. Norton, New York.

6 Padilla, J., J. Perkins & S. Piccolo (2020), "Self-Preferencing and Consumer Harm in Markets with Gatekeeper Platforms," SSRN Working Paper.

7 Jacobides, M.G., Cennamo, C. & Gawer, A., 2020. *Distinguishing between Platforms and Ecosystems: Complementarities, Value Creation, and Coordination Mechanisms.* Working Paper, under review.

8 Crémer, J., de Montjoye, Y.A. & Schweitzer, H., 2019. Competition policy for the digital era. *Report For The European Commission*. https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf ; HM Treasury (2019), Unlocking Digital Competition, *Report of The Digital Competition Expert Panel*. https://www.gov.uk/government/publications/unlocking-digital-competition-report-of-the-digital-competition-expert-panel.

ex post competition policy is more concerned with one-off interventions once anticompetitive behavior is observed.[9]

Early utility infrastructures also held high market concentration. These infrastructures were thought to be most effectively managed through natural monopolies, with national or state governments often regulating such monopolies to benefit from economies of scale, while avoiding duplication of costs.[10] The implication of this is that there were high switching costs for users, while the suppliers of those infrastructures benefited from strong network effects. Utility infrastructures in energy, telecommunications, transportation, and water supply evolved through vertical integrations, with a handful of suppliers (often even with a sole national supplier) capturing the value from utilities use while acting as gatekeepers. *Ex ante* regulation for breaking these monopolies and establishing more competitive policies that would drive down prices and accelerate innovation were eventually introduced (in the 1990s onwards), even though many monopolies still remain, especially in energy and water supply.[11]

Exactly because of their gatekeeping position, their ability to standardize production and consumption, and generate strong network effects with high switching costs for users some have argued that digital platforms should be regulated like early utility infrastructures.[12] However, digital platforms exhibit several differences that make utility regulation broadly inapplicable.

02

KEY DIFFERENCES BETWEEN UTILITY INFRASTRUCTURES & DIGITAL PLATFORMS

Firstly, digital platforms have very distinct technological architectures that enable different business models for the production and consumption of digital products and services.[13] As described above, digital platforms are built on layered modular architectures, which are product agnostic.[14] This means that they are not contained within single industries or market sectors as in the case of utility infrastructures. Market boundaries are permeable. Amazon's Alexa, a voice recognition application, embedded in Amazon's Echo, can offer voice activated streaming content from Amazon's music library and Kindle audiobooks, as well as integrate music services from third parties such as Spotify. Amazon Alexa may also integrate with other third-party services such as smart thermostats, lighting switches and other smart home applications, as well as order food from Deliveroo, a ride from Uber, and so on.

Thus, the technological architecture of digital platforms enables generative business models with varied customer bases, across products and services, and with distinct revenue models and data aggregation strategies that can also be monetized. Indeed, it is exactly the unique technological architecture of digital platforms that makes possible data aggregation and data-enabled learning, which can benefit not just current users, but potentially also new users when that learning can be incorporated into product improvements.[15]

Secondly, and following from the above, although the value that a digital platform generates for users and third parties can produce strong network effects, that value is not solely dependent on supply of services by the platform orchestrator. Much of that value is cocreated through demand-side economies of scale. Without platform participants, including end users and third parties such as app developers and advertisers, the platform itself becomes less valuable.

By contrast, utilities infrastructures feature strong supply-side economies of scale, with suppliers capturing all the value for themselves. The products and services delivered through these infrastructures, such as electricity and water are standardized and homogeneous with no opportunities for differentiation other than cost. There are limited value creation opportunities for third parties relative to digital platforms, because utility infrastructure offerings are bound within a highly specific market.16 Innovation is mainly fo-

9 Jacobides, M.G. & Lianos, I., 2021. Ecosystems and competition law in theory and practice. *Industrial & Corporate Change,* 00, 1-31.

10 Constantinides, P. 2012. *Perspectives And Implications For The Development Of Information Infrastructures*. IGI Global.

11 *Supra* note 10; Also see Constantinides, P. & Slavova, M., 2020. From a monopoly to an entrepreneurial field: The constitution of possibilities in South African energy. *Journal Of Business Venturing*, *35*(6), p.106061.

12 Ducci, F. (2020), *Natural Monopolies in Digital Platform Markets*. Cambridge University Press.

13 *Supra* notes 4 and 5.

14 *Supra* note 3.

15 Hagiu, A. & Wright, J., 2020. When data creates competitive advantage. *Harvard Business Review*, 98(1), pp.94-101.

16 Rutter, R, K J Chalvatzis, S Roper & F Lettice (2018), "Branding Instead of Product Innovation: A Study on the Brand Personalities of the UK's Electricity Market," *European Management Review* 15(2): 255–272.

cused on the maintenance and improvement of existing physical infrastructures (e.g. upgrades to 5G telecom networks). In contrast, digital platforms benefit from constant innovation across boundaries and thus new value creation and capture opportunities.

> ***Thus, the technological architecture of digital platforms enables generative business models with varied customer bases, across products and services, and with distinct revenue models and data aggregation strategies that can also be monetized***

Finally, digital platforms have different governance rules and control mechanisms for orchestrating the production and consumption of services.[17] Governance determines how a digital platform creates, delivers, and captures value, by creating incentives for participation, rules of competition and setting up barriers to entry.[18] These governance rules are part and parcel of the technology architecture and market scope of the platform. The orchestrators of digital platforms need to protect their own interests in competition with other firms, while also allowing complementors who contribute to value creation on the platform to secure their interests. The way the platform firm balances these trade-offs is through enforcement of governance rules, which affect the extent of, for example, multihoming across platforms vs. exclusivity strategies; and convergence of market and competitive domains.[19]

These governance rules include gatekeeping through a set of boundary resources such as software development kits and standard interfaces.[20] These governance rules also influence pricing strategies. Platforms use subsidies to deal with the chicken-or-egg dilemma to incentivize user and complementor participation, value creation and capture. They also bundle products through subscription, while also flexibly marking up star complementors (e.g. Amazon Prime Video subscriptions vs. premium content). Such pricing strategies depend on cross-side network effects and the respective demand elasticities for the different market sides.[21] While on the surface, utility infrastructure suppliers use similar pricing strategies, utility pricing does not depend on cross-side network effects and demand-side elasticities, nor on the market power of complementors.

03

WHAT SHOULD REGULATORS FOCUS ON?

Based on the above discussion, it becomes evident that digital platforms have very distinct *market*, *technology,* and *governance* scopes[22] than utility infrastructures. The *market scope* of a digital platform defines its business model. Unlike, utility infrastructures that are subjected to *ex ante* regulation to apply fairly uniform business models, digital platforms operate a spectrum of business models. Digital platforms are often found to set the rules of competition on their platform, while at the same time participating in the same markets and generating revenue and growth from both.

> ***These governance rules include gatekeeping through a set of boundary resources such as software development kits and standard interfaces***

For example, Apple allows Apple native apps to have in-app purchases, while inhibiting third party apps to do so – something which led to the Epic Games Inc vs Apple Inc lawsuit; Amazon collects data about third party products sold on its Amazon marketplace and then sells competing products directly to consumers, a practice known as 'Sherlocking'; Google is also using Google Play – a set of proprietary API on Android (e.g. Google Search, Maps etc.) – to

17 *Supra* notes 4 and 5.

18 Tiwana, A., 2013. *Platform Ecosystems: Aligning Architecture, Governance, And Strategy*. Newnes.

19 Cennamo, C., 2021. Competing in digital markets: A platform-based perspective. *Academy of Management Perspectives*, *35*(2), pp.265-291.

20 *Supra* notes, 3 and 4.

21 *Supra* note 5.

22 Constantinides, P., Cennamo, C. & Aaltonen, A. (2021) The Evolution of Digital Platforms. *Working Paper*. Under Review

sherlock data about competing apps, while also acting as a major player in online advertising and specialized search services (e.g. travel and accommodation).

As these examples show, often the market scope of these platforms is supported by their *technology scope,* that is, their technology architecture that allows them to internalize negative externalities, maximize positive generativity while monitoring for quality control, and by keeping competition where it benefits their own business model. For example, by adding Google Play as a set of middle-layer component in Android's architecture, Google aimed at addressing fragmentation because of multiple Android versions and improving interoperability and OS updates across original equipment manufacturers ("OEMs"). However, in doing so, Google essentially changed the open source technology scope of all Android versions to accommodate its business model.[23]

Even though in 2018, the European Commission forced Google to break up its anti-competitive practices – an *ex post* competition policy[24] – Google followed suit by changing its *governance scope* to offer separate licenses for each bundle of Google apps such as Maps, YouTube and Gmail, while charging for those. Exactly because Google Play has become the default option and with it making a number of other Google app bundles default options as well, OEM and users are deterred from leaving the Google Android ecosystem because of the high costs of switching.[25] For developers, these anti-competitive practices have an even bigger toll, since if they participate on Android versions without the pre-installed Google apps, not only is functionality between apps constrained, but also developers can no longer benefit from the network effects of the platform. They can no longer reach users and vice versa, users cannot find those third-party apps.[26] Thus, the governance scope is tightly interconnected to the market and technology scope of each digital platform.

Regulation such as the European Digital Markets Act are good starting points as *ex ante* regulation for digital platforms[27] because they focus on user base growth and revenue size to scrutinize gatekeeping activity. However, where they need further refinement is in understanding the interdependencies between the market, technology and governance scope of digital platforms that affect competition dynamics both within and across platform ecosystems. Scrutinizing the revenue generated through Google's specialized search and advertising business model alone, misses the point that the data collected from Google Search can help develop completely new services in Google's larger platform ecosystem, as directed by its technology and governance scope. The focus should not be on revenue and user base growth alone, which are the measures used by the Digital Markets Act to define a gatekeeper, but rather the technological architecture that enables apps to interconnect and how and with what impact for competition, as well as the governance rules for how value is created and captured by platform participants.

Digital platforms have the ability to respond to changes in different markets, adapt and even pivot to leverage new growth opportunities exactly because of their digital nature. They are not bound to the type of physical barriers that bound utility infrastructures nor are they constrained by industry boundaries. This makes regulating digital platforms very complex. We need both *ex ante* and *ex post* regulatory approaches that can account for this dynamic evolution of digital platforms, by paying attention at their business models, technology architecture and governance rules.

"Digital platforms have the ability to respond to changes in different markets, adapt and even pivot to leverage new growth opportunities exactly because of their digital nature

23 *Supra* note 22.

24 European Commission (2018) *Antitrust Investigation on Google* https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4581.

25 Stigler Committee (2019). *Stigler Committee on Digital Platforms: Final Report* https://www.chicagobooth.edu/research/stigler/news-and-media/committee-on-digital-platforms-final-report.

26 *Supra* note 22.

27 Cabral, L., Haucap, J., Parker, G., Petropoulos, G., Valletti, T.M. & Van Alstyne, M.W., 2021. *The EU Digital Markets Act: A Report From a Panel of Economic Experts.* Cabral, L., Haucap, J., Parker, G., Petropoulos, G., Valletti, T. & Van Alstyne, M., The EU Digital Markets Act, Publications Office of the European Union, Luxembourg.

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