

THE IMPACT OF ECONOMIC ANALYSIS ON MARKET DEFINITION IN THE CONTEXT OF DIGITAL PLATFORMS



BY NESTOR DUCH-BROWN & WOUTER VERGOTE¹



¹ JRC Seville and ESCP Business School, respectively.

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FRAGILE GIANTS: REASSESSING MARKET POWER IN PLATFORM ECOSYSTEMS

By Jonathan M. Barnett



THE IMPACT OF ECONOMIC ANALYSIS ON MARKET DEFINITION IN THE CONTEXT OF DIGITAL PLATFORMS

By Nestor Duch-Brown & Wouter Vergote



PLATFORM MARKET DEFINITION IN EU ANTITRUST LAW: THE CASE OF *ANDROID*

By Liliane Giardino-Karlinger & Rossitza Kotzeva



HOW TO APPROACH THE CALCULATION OF OVERCHARGE BY MULTISIDED PLATFORMS

By Rosa M. Abrantes-Metz & Albert D. Metz



COMPARE THE MARKETS: TWO-SIDED MARKET DEFINITION IN THE *COMPARETHEMARKET* CASE

By Andreea Antuca, Gunnar Niels & Helen Ralston-Smith



MARKET DEFINITION AND THREE 19A DESIGNATIONS UNDER GERMAN ANTITRUST LAW: ALPHABET, META, AND AMAZON

By Jens-Uwe Franck & Martin Peitz



A DEFINITION OF PLATFORMS WITH MEANINGFUL POLICY IMPLICATIONS

By Jørgen Veisdal



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While advances in economic theory, econometrics and data availability have helped antitrust authorities to fine-tune their approach to market definition in traditional brick and mortar markets, new economic insights have upended the applicability of the very same market definition tools in (digital) platform markets. We briefly discuss five complications laid bare by developments in the economics of digital platform markets: zero-price markets, personalized pricing, the single versus multi market approach to market definition, single-homing versus multi-homing, and non-generic complementarities in digital platform ecosystems. Notwithstanding these issues, established market definition tools can still serve as conceptual blueprints for market definition in the context of digital platforms.

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I. INTRODUCTION

Some 40 odd years ago, George Stigler wrote:

My lament is that this battle on market definitions, which is fought thousands of times what with all the private antitrust suits, has received virtually no attention from us economists. Except for a casual flirtation with cross-elasticities of demand and supply, the determination of markets has remained an undeveloped area of economic research at either the theoretical or empirical level.²

It is fair to say that economists certainly took heed of Stigler's cry for developing economic tools to help defining relevant markets. Theoretical advances in price theory and industrial organization³, combined with an abundance of (scanner) data have allowed economists to estimate with better precision, whenever the data allow to do so, the demand substitutability between different products and services. This evolution popularized the empirical implementation of the hypothetical monopoly test, or SSNIP test as tools to define markets.

Antitrust authorities followed suit and started to build their cases using these economic contributions and insights in a relatively consistent manner, first in the U.S. and later in the European Union. This was accompanied by transparent communication by competition authorities providing some level of legal certainty to market participants.

However, the economic insights that has helped antitrust authorities to fine-tune their approach to market definition typically apply to traditional brick and mortar markets. With the advent of new communication technologies, new types of (digital) markets started to gain importance. At the heart of these new business models is usually a digital platform, which offers a technology that brings together two or more sets of users (platform sides).

Whereas developments in economic theory and empirics in the 1970s and 1980s facilitated antitrust authorities' jobs in defining markets, it is not too much of a stretch to say that more recent advances, particularly in the economic theory of (two-sided) platform markets, and more broadly of business ecosystems that use a digital platform at the center of their operations, are upending the application of traditional tools developed by economists to delimit markets based on demand and supply substitutability.

While we now use the word "platform" synonymously with the likes of Airbnb, LinkedIn, or Uber, platform markets are certainly nothing new. The Champagne region in France was well known at the end of the 12th century, well before it became famous for its sparkling wine, for its year-round moving trade fair, attracting merchants, financiers, and other ancillary service providers, such as taverns. The count of Champagne designed the trade rules and necessary security measures in exchange for a small fee for every transaction that was settled on the fair. Such medieval market displays *cross-group network externalities*: the more merchants attend the fair; the more financiers will be interested in travelling to the fair as well to offer their services. The more financiers are present at the fair, the easier it becomes for merchants to finance their dealings.

In present day digital marketplaces this story certainly has a familiar tune to it. Before the end of the 20th century platform markets were relatively small in size, not attracting the same attention as digital platforms received during the last two decades. The arrival of large-scale digital markets (eBay, Amazon, ...) very quickly led economists to try to better understand how these markets work. Since the seminal contribution of Rochet & Tirole (2003) an extensive body of (economics) literature, both theoretical and empirical, has studied *two-sided markets*:⁴ markets in which two or more groups of market participants interact via a platform and thereby generate cross-group externalities. As a result, optimal pricing in two-sided markets differs fundamentally from pricing in standard markets, as affecting the demand through a price change on one side affects the value of the service on the other side(s) of the platform.

2 Stigler, George J. "The Economists and the Problem of Monopoly." *The American Economic Review* 72, no. 2 (1982): 1–11. <http://www.jstor.org/stable/1802294>.

3 To which George Stigler markedly contributed.

4 In line with the economics literature, we refer to multi-sided markets as being two-sided even if there are more than two distinct groups involved. See Rochet, J.-C. & J. Tirole (2003). Platform Competition in Two-Sided Markets, *Journal of the European Economic Association*, vol. 1, n. 4, June 2003, pp. 990–1029.

For the purposes of defining the relevant market, the theoretical insights gained⁵ seem to point in the same direction: indirect network effects between different sides of a (digital) platform cause the determination of competitive boundaries to be a more complex exercise. The empirical literature on platform markets⁶ has illustrated that such indirect network effects are important in real-life markets. Any competition authority should take heart of these lessons when assessing market definition in a platform setting.

At about the same time the two-sided market revolution kicked off, the concept of a “Digital Business Ecosystem” was coined, in the context of the implementation of the eEurope 2002 action plan,⁷ to describe an interdependent group of entities (businesses, governmental and non-governmental agencies, individuals) that share one or more digital platform(s) through which they mutually gain. In the literature these are also known as digital platform ecosystems.

Traditionally, firms have been seen as entities that create value through the development and production of a service, within the boundaries of the firm *in a particular market for that service*. Digital platforms, on the other hand, rely on an ecosystem of autonomous agents that allows them to jointly create value. In a digital platform ecosystem the platform and other *independent* entities complement each other, in a *non-generic* (specific) way, thereby creating value for customers and users. As such, digital platforms bring into being a novel competitive model in which entire digital ecosystems compete with one another.

A good example is the rivalry between the Android and iOS ecosystems. Many observe that these two ecosystems display strong lock-in effects: the variety of services Apple offers for which an iPhone is needed make it very difficult to switch to Android and *vice versa*. High switching costs create barriers to entry and hence may call for antitrust concern which will often require a definition of the relevant market. In a digital ecosystem with interlinked but independent actors, the delineation of the market is more challenging. As Jacobides & Lianos (2021) put it, the “*field of competition is not a single product market, but an ecosystem of complementary products.*”⁸

We briefly discuss five important roadblocks towards defining relevant markets that economic analysis of digital markets laid bare during the last 20 years: zero-price markets, personalized pricing, single versus multi-market approach, single-homing versus multi-homing, and digital platform ecosystems.

II. DIGITAL MARKETS AND MARKET DEFINITION: ROADBLOCKS

A. No Price, No Market?

In many digital platform markets one or more groups of participants do not pay for (some version) of the services offered by the platform. Does the absence of a price imply that there is no market and consequently, should antitrust authorities only focus their definition of the relevant market on the paying side(s) of a platform market?

A critical insight from the two-sided markets literature is that not charging one side of the platform is often a perfectly sound business strategy given existing cross-group network effects. This is often the case when one side suffers a negative externality by the presence of the other side (e.g. undesired advertising). In addition, many argue that consumers of zero-price products pay with their data – information - and with their time - attention.⁹

5 For an excellent discussion of these we refer the reader to Evans (2011), Dewenter et al. (2017), OECD (2018) and Franck & Peitz (2019 and 2021). See Evans, David S. & Schmalensee, Richard and Noel, Michael D. and Chang, Howard H. & Garcia-Swartz, Daniel D., Platform Economics: Essays on Multi-Sided Businesses (December 17, 2011). PLATFORM ECONOMICS: ESSAYS ON MULTI-SIDED BUSINESSES, David S. Evans, ed., Competition Policy International, 2011, Available at SSRN: <https://ssrn.com/abstract=1974020>; Dewenter, Ralf & Heimeshoff, Ulrich, Löw, Franziska. (2017). Market Definition of Platform Markets. 10.13140/RG.2.2.33515.75043; OECD, Rethinking Antitrust Tools for Multi-Sided Platforms. <https://www.oecd.org/daf/competition/Rethinking-antitrust-tools-for-multi-sidedplatforms-2018.pdf>.

6 For a good overview see Jullien et al. (2021). A paradox though is that despite the progress in digital technologies, there is little data available to run empirical tests for digital platforms. This is an important difference with respect to the empirical analysis of brick-and-mortar markets for which scanner data is often available. See Jullien, B., Pavan, A., Rysman, M., 2021. Two-sided markets, pricing, and network effects. Handbook of Industrial Organization, vol. 4. Elsevier, pp. 485–592.

7 See <https://op.europa.eu/en/publication-detail/-/publication/53e45e55-4bd2-42a4-ad25-27b339b051e0>.

8 Jacobides, M. G., & Lianos, I. (2021). Ecosystems and competition law in theory and practice. Available at SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3772366.

9 Newman, J. (2015). Anti-trust in Zero-Price Markets: Foundations, University of Pennsylvania Law Review 164(1):149-2061, DOI: 10.2139/ssrn.2474874.

A zero price of course complicates the application of traditional market definition tools (hypothetical monopolist or “SSNIP” test). Obviously, no percentage price increase can be added to the current zero price. A quick fix would be to add a small but discrete increase in price. The difficulty with this approach is the transaction cost, timewise and psychological, that is associated to paying a small but positive price. A suggested solution is to use the “small but significant non-transitory *decrease in quality*” (“SSNDQ”) test.¹⁰

Even if a quality-adjusted alternative to the SSNIP is used, an additional complication arises in the case of two-sided markets. A hypothetical monopoly will, in the presence of cross-group network externalities, respond to a change of price or quality on its ‘zero-price side’ by optimally adjusting its price and/or quality structure at the other side of the market. This effect should be taken into account in order to assess the profitability of the initial increase in price or decrease in quality.

A. Digital Data, Price Discrimination and Market Definition

Digital platforms have access to and collect the information provided by its users.¹¹ The arrival of big data and data algorithms have permitted firms to obtain fine-grained information that expedited different forms of price discrimination. Many¹² argue that advances in digital tracking allows for more accurate consumer profiling, which in turn helps to facilitate first-degree price discrimination or personalized pricing. Similar arguments can be made about quality discrimination.¹³

In order to define the relevant market in the presence of varying degrees of personalized pricing, the antitrust authority should have a good grasp of the data and the tracking technology available. Given limited information, time, and resources, this is a herculean task.

B. Multi-Market versus Single Market Approach

When ascertaining market definition corresponding to the activities of a digital platform, two avenues have been taken in practice by antitrust authorities. In some cases,¹⁴ a single market approach has been adopted: a particular intermediation service of the platform is considered to be a single market. In other cases, a multi-market approach has been followed: the platform provides (potentially) different services to both sides of the platform, and hence competitive constraints on these services on each side of a platform should be analyzed separately, understanding that the sides are connected through cross-group externalities.

For example, when following the single market approach a credit card company serves as an intermediary between sellers and buyers. This single market approach then tries to understand the competitive constraints imposed by other credit card providers, or other payment systems (such as cash). In contrast, if a multi-market approach is adhered to, a credit card company offers a payment service to both cardholders (a channel through which they can make payments) and vendors (a channel through which they can receive payments), but the service on each side can be subject to different competitive constraints.

Franck & Peitz (2021) argue against the adoption of a single market approach as it does not allow for “different substitution possibilities by the user groups on the two sides of a platform.” They continue by saying that “It [the multi-market approach] is based on the economic primitives of the market and not on derived constructs such as an overall demand for an intermediation service, which depends on demand substitutability on each side of the platform as well as on the cross-group network effects linking the two.”¹⁵ We agree that using the more flexible multi-market approach allows for different demand substitution patterns on each side, taking into account that these patterns depend on cross-group network effects.

10 See Quality considerations in the zero-price economy – Note by the European Union. [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD\(2018\)135anddocLanguage=En](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD(2018)135anddocLanguage=En).

11 For many important platforms, this is at the core of their business model (Facebook, ...).

12 See Belleflamme, P. & W. Vergote, (2016), Monopoly price discrimination and privacy: the hidden cost of hiding, *Economics Letters*, 149, issue C, p. 141-144; Belleflamme, P., Lam, W.M.W. & W. Vergote (2020). Competitive Imperfect Price Discrimination and Market Power. *Marketing Science*; and Bourreau, M. & de Streel, A. & Graef, I. (2017), Big Data and Competition Policy: Market Power, Personalised Pricing and Advertising (February 16, 2017). Available at SSRN: <https://ssrn.com/abstract=2920301> or <http://dx.doi.org/10.2139/ssrn.2920301>; Franck, J.-U. & M. Peitz (2019). Market definition and market power in the platform economy. CERRE report. May 2019; Franck, J.-U. & M. Peitz (2021). Market definition in the platform economy. CRC TR 224 Discussion Paper Series 2021.

13 See Duch-Brown, N. (2017). "Quality discrimination in online multi-sided markets," JRC Working Papers on Digital Economy 2017-06.

14 Franck & Peitz (2019) provide an excellent overview of recent antitrust practice in line with the single and/or the multi-market approach. See Franck, J.-U. & M. Peitz (2019). Market definition and market power in the platform economy. CERRE report. May 2019.

15 See Franck, J.-U. & M. Peitz (2021). Market definition in the platform economy. CRC TR 224 Discussion Paper Series 2021, p. 16, https://www.wiwi.uni-bonn.de/bgse-papers/boncrc/CRCR224_2021_259v2.pdf.

C. Single-Homing v. Multi-Homing and Market Tipping

Single-homing, in contrast to multi-homing, refers to the situation in which users decide to use only one (digital) platform when more than one is available. Users typically do so when it saves time, money and “simplifies life” or when joining another platform generates little additional value. Multi-homing, if it exists, can offset feedback loops created by positive network effects, which reduces barriers to entry and lowers the probability of market tipping.

For the purpose of market definition, it is then important, on a case-by-case basis, to identify the presence of factors that facilitate multi-homing decisions such as the cost of joining a platform, the degree of product differentiation between platforms, the existence of contractual clauses which hamper multi-homing and whether other sides of a platform exhibit multi-homing.

D. Digital Platform Ecosystems and Market Definition

The strategic management and the nascent economics literature¹⁶ on digital platform ecosystems observes that digital ecosystems are different from platforms, on which the former are very often built. The term platform usually refers to the technology that promotes the interaction between users, the owner of which controls the parameters of such interaction (access, price, quality, ...).

Ecosystems, on the other hand, are more decentralized in nature and result from the interactions, coordinated or not, between the different actors. A central concept in digital ecosystems is the existence of non-generic complementarities.¹⁷ These are the benefits one actor or firm, call her A, receives when another actor, call her B, makes a specific investment(s) making her products complementary with A’s services, and vice versa. Jacobides et al. (2018, 2020) define an ecosystem as “a set of actors with varying degrees of multilateral, non-generic complementarities that are not fully hierarchically controlled.”¹⁸ These complementarities can be observed on the supply side (production) or on the demand side (consumption).

Digital ecosystems are very often multi-actor and multi-product systems, severely reducing the usefulness of the traditional concept of market definition, which in essence tries to define a single product market, while digital ecosystems compete through a collection of complementary products. Hence, if there exist important supply and demand-side non-generic complementarities, then the traditional relevant market definition based on product and/or geographic substitutability loses its relevance.

The drawbacks of the substitutability method and hence the poignant consequences for competition policy have been highlighted almost exclusively from a theoretical point of view. It is therefore important to empirically confirm, or not, the presence of non-generic complementarities. The empirical literature attempting this is very scant. One recent contribution is Carballa-Smichowski et al. (2021) who document the importance of demand side linkages: 18 percent of 246 major European digital platforms display these types of linkages.¹⁹ Their findings suggest that it may be desirable that antitrust authorities are open to widening the definition of the relevant market by considering markets linked through non-generic complementarities.

III. CONCLUSION

Advances in economic theory certainly helped to develop tools antitrust authorities use to define markets, especially if demand data are available and elasticities can be estimated. However, more recent advances in economic analysis laid bare many complications to the (empirical) application of market definition in digital markets. While further economic and multidisciplinary analysis may certainly be able to offer better guidance to antitrust authorities in the future, one should be careful not to throw the baby out with the bathwater before such guidance is available. Tools,

¹⁶ Digital (business) ecosystems received more attention from the strategy literature and only recently from the economics literature (Hein et al. (2020) and OECD Note by Marc Bourreau (2020)). See Hein, A., Schreieck, M., Riasanow, T. et al. Digital platform ecosystems. *Electron Markets* 30, 87–98 (2020). <https://doi.org/10.1007/s12525-019-00377-4>; Bourreau, M. and de Streel, A. and Graef, I. (2017), Big Data and Competition Policy: Market Power, Personalised Pricing and Advertising (February 16, 2017). Available at SSRN: <https://ssrn.com/abstract=2920301> or <http://dx.doi.org/10.2139/ssrn.2920301>.

¹⁷ This is relevant as in brick-and-mortar markets the main issue behind demand estimation (as the basis for market definition) is based solely on substitution and avoids making any reference to complementarity.

¹⁸ See Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic management journal*, 39(8), 2255–2276; Jacobides, M. G., Cennamo, C., & Gawer, A. (2020). Distinguishing between platforms and ecosystems: Complementarities, value creation, and coordination mechanisms. Working paper, under review.

¹⁹ Carballa Smichowski B., Duch-Brown N., Gomez Losada A. & Martens B. (2021). "When 'the' market loses its relevance: an empirical analysis of demand-side linkages in platform ecosystems," JRC Working Papers on Digital Economy 2021-07, Joint Research Centre (Seville site).

such as the SSNIP or SSNDQ test, provide a conceptual blueprint to assess demand substitutability in digital markets or ecosystems. This seems to have been a guiding principle of the European Commission's draft revised market definition notice, which it released on November 8, 2022.²⁰



²⁰ European Commission (2022) https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6528.

