



JRC TECHNICAL REPORTS

JRC Digital Economy Working Paper 2017-07

Platforms to business relations in online platform ecosystems

Néstor Duch-Brown

2017

This publication is a Technical report by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication.

Contact information

Address: c/Inca Garcilaso 3, 41092 Seville, Spain
Email: **JRC-LIST-B6-SECRETARIAT@ec.europa.eu**
Tel.: +34 954488456

JRC Science Hub

<https://ec.europa.eu/jrc>

JRC109186

ISSN 1831-9408

Seville: European Commission, 2017

© European Union, 2017

Reuse is authorised provided the source is acknowledged. The reuse policy of European Commission documents is regulated by Decision 2011/833/EU (OJ L 330, 14.12.2011, p. 39).

For any use or reproduction of photos or other material that is not under the EU copyright, permission must be sought directly from the copyright holders.

How to cite this report: Néstor Duch-Brown, Platforms to Business Relations in Online Platform Ecosystems, JRC Digital Economy Working Paper 2017-07, JRC109186.

All images © European Union 2017

Contents

- Acknowledgements2
- Abstract3
- 1 Introduction4
- 2 The vertical structure of two-sided markets6
 - 2.1 Preliminaries: the traditional economics of buyer power6
 - 2.2 Platforms’ downstream power8
- 3 Data 10
- 4 Some “back-of-the-envelope” calculations of the impact of lack of transparency 11
- 5 Firms' choice of online channel 14
 - 5.1 Platforms in the firm's online strategy 14
 - 5.2 The decision to use a platform 17
- 6 Firms operating with platforms 24
 - 6.1 Do firms multi-home? 24
 - 6.2 Which category of platforms firms choose? 26
 - 6.3 Delineating markets in the European online platforms ecosystem 28
- 7 Conclusions 31
- References 33
- List of tables 35
- Annexes 36
 - Annex 1. 36
 - Annex 2. 37

Acknowledgements

I would like to thank Estrella Gomez-Herrera, Annette Schminke, Georgios Alaveras, Frank Mueller-Langer and Bertin Martens for invaluable help and assistance in the preparation of this report. In addition, I want to thank Michel Millot, Menno Cox, Diana Vlad-Calcić, Prabhat Agarwal, Jacek Starczewski, Michal Mottl, Velimira Grau, Olli Rappe, Werner Stengg, Claire Whittaker, Andrei Bunis, and Maria Rehbinder for their comments, suggestions and feedback that significantly improved the contents of this report. Remaining errors and omissions are the sole responsibility of the author. The views and opinions in this paper are the author's and do not necessarily reflect those of the European Commission.

Authors

Néstor Duch-Brown

Abstract

This report presents evidence on the relationship between online platforms and businesses using these platforms to reach consumers or conduct their operations. First, we review the literature on vertical relationships both from a classic approach and from a multi-sided market perspective. Second, we use survey data to explain the factors behind firms' choice of online channel. Third, we explore the results of a survey passed to firms using platforms to understand their concerns about the behaviour of some of these online gatekeepers. Finally, we offer some conclusions.

1 Introduction

In multi-sided markets, different sets of users – for instance buyers, sellers and advertisers- interact with each other via a platform (or multi-sided market). The main feature of these markets is that the benefits that one group of users derive from interaction depends on network effects, i.e. the number of users in the other(s) group(s). Commonly quoted examples of such platforms are credit cards, video game consoles, and newspapers and magazines. Many digital services that have appeared in the past two decades also operate as platforms, such as online marketplaces, search engines, social media and app stores, to name just a few. Recently, economists and policy makers have devoted significant attention to two-sided markets. Theoretical work has significantly advanced knowledge about how these markets operate and has established that both competition and related policies can diverge considerably from those that prevail in traditional one-sided markets.

In its assessment of online platforms, the Commission detected the existence of “unfair” commercial practices imposed by platforms as intermediaries between different types of users that can be particularly burdensome for small companies. In this project we focus on potential unfair practices imposed on suppliers to the platform (the P2B side of the platform). When operating a platform, an intermediary has the ability to control the number of traders and the volume of trade of the market. Network effects allow successful platforms to attain large sizes and drive competitors out of the market. Powerful economic actors can potentially abuse their privileged positions in order to impose unfair terms and conditions on users in some (or all) sides of the market. A legitimate concern – especially from a policy perspective – is to wonder if this phenomenon may be negatively affecting social welfare, i.e. the combined welfare of all users.

Due to their nature, platforms connect downstream consumers (users) with upstream firms (sellers/producers/content providers) in a vertical relationship. For consumers, they are perceived as large sellers in a Business-to-Consumer (B2C) relationship. For sellers, they stand as large buyers¹, and a Business-to-Business (B2B) link is established. Large and powerful buyers can be found in many markets. For instance, the degree of concentration in the grocery industry has steadily increased in recent years. As the size of retailers has grown larger, attention has mounted over the relationships being established by these large buyers and their suppliers.

In the digital economy, powerful platforms have established themselves as crucial intermediaries for online transactions. As in the more traditional world, some electronic markets have also started to be characterised by strong players that exert a significant pressure on upstream users (sellers or suppliers, the B2B side of the platform). For example, in 2016 Amazon had a market share of 20% of total online sales in the EU. However, in some countries, its market penetration is even more notorious. For instance, in Germany, Amazon represents 40% of total online sales, 27% in the UK and 20% in Greece. Some of these companies have started to be described as giants using aggressive practices to put the squeeze on their trading partners. As a result, calls for antitrust intervention and regulatory rules to protect suppliers have become increasingly common in the digital world. This links the "fairness" debate in vertical P2B relations between platforms and their suppliers to competition issues. However, the nature of the relationships goes beyond competition, since depending on the market definition – a concept that is under heavy discussion in the case of the digital economy-, most if not all big platforms do not reach the threshold levels to be declared as dominant players.

Yet, there is a lack of evidence and empirical literature analysing the interactions among platform participants from a vertical market structure point of view. This vertical structure is represented by both the P2C and P2B relationships of the platform with the different sides. In this report, we concentrate on the P2B side of the platforms. First, we

¹ This is to say that they can exploit their market power in both sides on the market, even though platforms are not really selling or buying products.

revise the state of the art of the literature on buyer power in traditional markets. Secondly, we revise the few papers that deal with the vertical structure of two-sided markets, with particular attention to the connections between the platform and the users in the upstream side (sellers in a vertical P2B relationship with the platform). Third, we describe the data used in this report. Fourth, we provide some very rough estimates of the economic impact that unfair trading practices may have in the EU economy. Fifth, we analyse firms' decisions to use platforms, and the intensity of use. Sixth, we check whether, according to the data, the companies tend to use several platforms simultaneously or not, a phenomenon called multi-homing in the economics literature. We also look at the delineation of market boundaries, given firms' choices of platforms. The last section includes the conclusions and the limitations of this study.

2 The vertical structure of two-sided markets

Platforms, as other economic agents in a given industry, face interactions with other agents in two different dimensions: horizontal and vertical. Horizontal relationships refer to competition at the same stage in the value chain. For instance, two retailers compete against each other for the consumers' demand. Similarly, producers of an intermediate good will compete for the demand of producers at the following production stage. Platforms compete to attract users to the different sides. On the contrary, vertical relationships are defined as buyer-seller interactions. These interactions can be direct, when buyers interact with sellers; or indirect if an intermediary steps in to facilitate transactions. In this case, interactions are more complex, since the final outcome will depend not only on the market structure on both sides (upstream and downstream) but also on the relative bargaining power of sellers and buyers. In the case of platforms, these vertical relationships are heavily determined by the type of activity, which in turn affects the different groups of users operating through the platform and the nature of network effects at work.

Market forces and firms' strategies will shape both horizontal and vertical competition. The number of firms that participate in each stage, its relative size and particularly the strategic decisions taken by them will define the intensity of competition, the existence of market power and the possibilities to abuse such power to extract above-normal profits in both dimensions. When there is seller market power at every stage in the value chain, the natural outcome will imply a high final price, and only a reduced amount of consumers will be able to purchase. This is due to the fact that the final price will include the mark-up of each successive production stage, a phenomenon called the double-marginalisation problem². This would be the B2C case.

However, a buyer can also exercise market power to influence the terms of trade with its suppliers. In this case, the firm is said to possess "buyer power"³. In this case, we would refer to B2B interactions. Compared to the traditional analysis of market power, the economics of buyer power is less developed and both the theoretical and empirical results less consolidated. The dominant explanation relies in the "countervailing power" argument. In its simplest form, this idea states that demand-side market power tends to decrease prices, compensating for the seller market power, which tends to increase prices.

2.1 Preliminaries: the traditional economics of buyer power

Buyer power has been defined as "the ability of buyers to obtain advantageous terms of trade from their suppliers" (Inderst and Shaffer, 2008; p. 1612) or as "the circumstance in which the demand side of a market is sufficiently concentrated that buyers can exercise market power over sellers" (Noll, 2005; p. 589). In general, the term applies to a variety of situations since large buyers can emerge by growth or merger.

The literature distinguishes between two different analytical frameworks used to characterize buyer power and to derive its implications. The first framework (Scherer and Ross, 1990; Blair and Harrison, 1993), assumes that upstream and downstream firms interact through markets. Here, in its simplest manifestation, buyer power represents the perfect mirror image of seller power. While sellers may exercise market power through withholding supply, buyers may be able to reduce the (uniform) market price for an input

² The term comes from the bilateral monopoly model, the standard framework to capture the vertical structure of an industry. In this model, there is one firm upstream and one firm downstream; hence the final price will include two mark-ups over marginal costs, one for each firm. Generalisations to many stages are straightforward.

³ Buyers can also be intermediaries. As a matter of fact, a buyer represents any firm or economic agent that operates downstream in any vertical (seller-buyer) interaction. Hence, a "buyer" can be interpreted either as a firm that buys products downstream to resell them upstream, or to an intermediary that connects two groups of users.

by withholding demand. The key assumption is that the only way to achieve a lower price (by withholding demand) also benefits all other buyers⁴. The alternative scenario is one where there are relatively few upstream and downstream firms in the market, such as large retailers and the producers of branded goods that interact bilaterally⁵. In such an environment, there could be substantial variations in the average prices paid by different buyers. Buyer power may then manifest itself precisely through the size of individually negotiated prices, fees or discounts. Markets for fresh foods could be an example of the first. Markets for luxury products represent the second.

Among the factors that contribute to buyer power, often the size of retailers is quoted as an obvious determinant. First, if a buyer is large enough it can credibly threaten to incur even substantial costs and integrate backwards, thereby completely eliminating the supplier (Katz, 1987; Sheffman and Spiller, 1992). Also, it may make it profitable to switch to more competitive procurement methods such as auctions (Nordemann, 1995; Steptoe, 1993). An alternative source of buyer power is related to the properties of production technologies. A common argument is that large buyers should have a particular advantage in industries that are characterized by potentially large economies of scale (Smith and Thanassoulis, 2006; Inderst, 2007). The presence of private labels can substantially enhance a buyer's bargaining position. By stocking private labels next to manufacturers' goods in a given category, a retailer may enter into direct competition with its suppliers (Scott-Morton and Zettelmeyer, 2004; Sayman et al., 2002). Changes in consumers' preferences, such as reduced brand loyalty for certain product categories, may certainly be conducive towards weakening manufacturers' bargaining position⁶. In this setting, the competitive process is characterised as one where retailers compete for consumers' patronage while manufacturers compete for shelf space at the retailers' outlets⁷. More generally, consumers' behaviour is very important in determining the relative bargaining power in negotiations between retailers and suppliers.

If a powerful buyer obtains a discount that is, at least partially, passed through into lower final prices, this should benefit its own clientele (Inderst and Shaffer, 2007). Given that lower final prices lead to a further growth in sales, the retailer, having grown in size may enjoy more buyer power. It may be the case that less powerful retailers could not lower prices in response to competition. This could happen, for example if suppliers reacted by raising wholesale prices for other, less powerful retailers, in response to the increased buyer power of one customer. The most basic argument that is sometimes used to support the existence of such a "waterbed effect" is that in order to remain in business, suppliers are somehow forced to recoup elsewhere the margins they lost in their transactions with more powerful retailers (Inderst and Valletti, 2011).

Finally, the transaction costs approach to intermediation has been summarized in Spulber (1999). Here, the intermediary has a cost advantage over other sellers as a result of economies of scale from centralized trading. Buyers and sellers must be connected to enable trading, but forming connections is costly. There is a fixed cost of setting up a central intermediary to facilitate trade, but such a network minimizes the number of connections required to enable trade between all buyer-seller pairs. Therefore, having an intermediary improves total surplus for sufficiently many buyers and sellers⁸.

⁴ This holds for a variety of models. However, this view seems to be most appropriate for competitive upstream markets, where the assumption of a uniform trading price may be justified. See, for instance, Hendricks and McAfee (2010).

⁵ In this case, economists most frequently rely on the Nash Bargaining Solution, proposed originally by Nash (1950), and later refined by Osborne and Rubinstein (1990).

⁶ The marketing literature has devoted several theoretical and empirical studies towards this joint development. See for instance Messinger and Narasimhan (1997).

⁷ In the language of the economics of platform competition, it is sometimes said that consumers end up with "single-homing" at one outlet. Armstrong (2006) refers to this situation as one of "competitive bottlenecks".

⁸ An alternative approach on the basis of conflict in distribution channels is also active in managerial and business studies. We do not revise this literature here, but for a good overview of the competing views see Eshghi et al. (2015).

2.2 Platforms' downstream power

The economics and business literatures on multi-sided markets to date have devoted most of its efforts to analyse pricing strategies (Rochet and Tirole, 2003 and 2006; Caillaud and Jullien, 2003; Parker and Van Alstyne, 2005; Armstrong, 2006). Although some papers started to tackle some design issues (Hagiu and Jullien, 2011; Parker and Van Alstyne, 2008), there has been very little formal work on organisational design, governance rules and the factors that drive platforms to restrict access beyond what they can achieve through pricing alone. An important part of many real-world platform strategies are non-price decisions which regulate access to and transactions on the platforms (Boudreau and Hagiu, 2009). One of the most common platform governance rules is the restriction of access on at least one side, resulting in the exclusion of some customers who are willing to pay the platform's access and/or transaction fees.

The vertical structure of two-sided platforms has been explicitly considered in some recent contributions. Hagiu (2009) is among the few papers modelling the micro-structure of buyer and seller interactions in multi-sided platforms. He shows that consumers' strong preferences for product variety are equivalent to less competition between producers. Therefore, the platform extracts more rents from the producers' market power. Galeotti and Moraga-González (2009) suggest that an increase in the number of retailers increases the extent of product variety in the platform. This in turn increases competition. Anticipating that the equilibrium price of the goods will fall, the platform would lower the fees paid by the firms and raise the fees paid by the consumers. Edelman and Wright (2015) allow sellers to compete for buyers both directly and through a platform. The authors focus on the welfare effects of price coherence, and establish a distortion that arises on the extensive margin (whether buyers join a particular platform), whereas the existing literature focuses on the intensive margin (whether platforms are efficiently used). Their results indicate a systematic bias in the fee structure towards users resulting in the excessive use of the platform. By offering benefits to buyers at no direct charge, intermediaries cause excessive usage of their services usage which then lets intermediaries extract significant fees from sellers, indeed beyond even normal monopoly fees.

Evans (2012) argues that an essential feature of platforms is that they promote positive externalities between members of the community. But as with any community, there are numerous opportunities for users to also generate negative externalities that can reduce economic efficiency. As it turns out, many of these platforms have developed governance systems for dealing with bad behaviour. These governance systems ultimately depend on the ability of the platform to partially or fully exclude agents from the platform. Exercising these exclusionary rights is controversial. The platform has to balance the interests of its multiple constituents. Rules concerning indirect network effects shift value between different sides. The exercise of exclusionary rights to enforce rules can also lead to complaints by the excluded parties and in some cases lawsuits.

In a follow-up paper, Evans (2013) reviews the use of vertical restraints by multi-sided platforms. Exclusive dealing and other similar vertical restraints that bind customers to the platform are more likely to be pro-competitive practices in the early stages of the lifecycle of platform industries. Second, in assessing whether vertical restraints on one side of a platform generate efficiencies it is important to look at the impact of these restraints on the other sides of the platform. These restraints could provide customers on the other side with the benefits of knowing that particular kinds of customers they want to interact with are available on the other side. Third, in assessing whether there are pro-competitive benefits of vertical restraints it is important to consider their role in harnessing positive and negative externalities in ways that increase platform value. Vertical restraints could help increase positive network effects and also limit customers on one side from engaging in behaviour that harms customers on the other side. Finally, in assessing whether vertical restraints could foreclose a rival it is important to assess the impact of the restraints on the ability of the rival to reach critical mass. That will ordinarily involve examining the types of customers that are foreclosed to the rival, their

positive externalities with customers on the other side of the platform, and their overall importance in moving the platform to critical mass.

The relationship between a platform and its sub-markets is considered in Tremblay (2016). The mode of competition that exists within sub-markets affects the network effects between consumers and sellers, which in turn affect agents' participation decisions and platform pricing strategies. The network benefits that consumers and sellers receive from joining the platform are determined by consumer demand and the competitive structure that exists among sellers for these products. If there is less competition within a sub-market, then the price of the product will be higher, resulting in greater network gains for sellers but lower network gains for consumers. However, the size of the network also matters. More consumers on the platform increases demand for a product and more products available on the platform makes participation on the platform more desirable for consumers. When the number of sellers within a sub-market increases, competition within a sub-market increases, each seller receives less expected profit from a given consumer; thus, the platform has less of an incentive to provide sellers with additional consumers resulting in the platform serving fewer consumers. The platform reduces consumer participation when the number of sellers increases, and this result is robust to many types of competitive structures within sub-markets.

3 Data

The data collected in this report can be classified in two different categories. The first one refers to the surveys conducted on behalf of the Commission. The second one refers to information related to aggregate industry information available in databases and data from individual platforms collected by the JRC.

The first group of datasets includes two main sources. The first one is the business survey included in the Flash Eurobarometer 439, "**The use of online marketplaces and search engines by SMEs**", carried out in April 2016. The survey covers businesses employing 1 to 250 persons in 10 countries (Denmark, Estonia, France, Germany, Ireland, the Netherlands, Poland, Spain, Sweden, and the UK), from 7 sectors (NACE categories G, H, I, J, M, N, and R). The survey includes 500 firms in every country except Denmark, where 400 firms were surveyed. With the appropriate weights, these data can be inflated to be representative of the universe of European firms.

The second source of information is a survey directed to firms participating in platforms. The main focus of the questionnaire was to assess to what extent firms have been facing problems in their relationships with platforms. The project "**Business-to-Business relations in the online platform environment**" was carried out by a consortium led by Ecorys under a specific contract with DG CNECT and DG GROW. In this project, five surveys were conducted, three for business and two for online platforms. Focusing on the business surveys, one was by invitation only by Ecorys after creating a list of firms using platforms; one survey used an open invitation made available via the website of the European Commission; and one survey was based on a panel of enterprises by TNS. In total, 3787 firms -2553 from the panel and 1234 from the open and closed surveys combined- replied to the questionnaire. The panel includes data for firms from 1 to 250 employees in 7 countries (Germany, France, Spain, Sweden, Lithuania, Greece, and Slovakia), from 21 sectors. On the contrary, the data from the open and closed surveys include firms operating in 49 different countries and in 18 different economic activities.

4 Some “back-of-the-envelope” calculations of the impact of lack of transparency

In this short section, we derive some very rough estimates of the volume of economic value lost in the EU economy derived from the uncertainty generated by the lack of trust vis-a-vis online platforms.

These simple calculations are useful to understand the magnitude of the effects unfair practices may produce in the European economy. Given the absence of meaningful datasets, these estimations may serve as indicators of the potential negative impacts of these types of practices to complement the information derived from the collection of anecdotal evidence.

Methodologically, the calculations below follow the same structure. From an estimated value of turnover in a given activity in the EU economy, we calculate the size of the current dampening effect that the uncertainty deriving from harmful trading practices and the general lack of available redress has on turnover generated via online platforms. This dampening effect is assumed to be in the range of between 1% and 10%⁹, which is conservative because some business users have identified significant negative effects currently occurring including impacts on their turnover or their innovation potential.¹⁰ We assume that this effect is derived from the operations of the platform in terms of search costs and better matching between users, and not related to industry characteristics. In some cases, when data is available, it is also possible to compute the lost jobs and the lost number of business users of platforms.

Marketplaces

According to Euromonitor¹¹, the online retail value generated by 3rd party sellers in the EU in 2016 was €54.566,5 Million, representing 22% of total online retail.

Using information about sellers’ sales volumes and using data from Webretailer¹² and our own surveys (Ecorys), the average size of a 3rd party seller using platforms is estimated to be between € 250k and 1M. This would imply that, according to these figures, there are between 54.566 and 218.266 3rd party sellers operating with platforms in the EU in 2016.

According to Webretailer, 60% of sellers fear of being banned by platforms¹³. Assuming that effectively 60% of sellers were banned from online marketplaces, that would amount to around € 30 billion lost sales by 3rd party sellers.

In addition, it is known from the surveys (Ecorys) that a large proportion of sellers have faced problems with platforms. If we assume that these problems have the effect of reducing revenue by a conservative range between 1% and 10%, we are talking about values between **€ 0.6 billion** and **€ 5.5 billion** in lost revenue for sellers. This is a

⁹ This assumption comes from several rounds of interactions with DG CNECT. Unfortunately, we do not have supporting evidence to confirm that this may be in fact the case. Further research is needed to be able to appropriately assess the potential impacts of UTPs and lack of transparency.

¹⁰ Ecorys, 'Business-to-Business relations in the online platform environment', FWC ENTR/300/PP/2013/FC-WIFO, Final Report, e.g. page 12: "*The lack of transparency in the search and ranking criteria and the perceived lack of consistency in application of the ranking criteria (discrimination) have a detrimental impact on innovation by business users, with efforts focused on meeting the criteria of the algorithm rather than meeting the actual consumer demand*".

¹¹ Euromonitor International, Passport Database 2016 Edition.

¹² Webretailer is a website for businesses who sell through online marketplaces. They conduct regular surveys on topics of interest to sellers. In 2016 they passed a questionnaire on sellers on Amazon (<http://www.webretailer.com/lean-commerce/amazon-sellers-survey-2016/#/>) and in 2014 one on sellers in several marketplaces. They claim to have circa 20k affiliates worldwide. In the last survey, they asked for problems and 61% replied the biggest concern was being banned from selling on Amazon.

¹³ More concretely, they fear to be banned by Amazon. However, we extrapolate this to the case of all platforms for the example given in the text as an extreme assumption.

deadweight loss (i.e., a net welfare reduction for society) since this is not captured by the platforms, it is simply the cost of the inefficiency/low quality.

This figure refers only to e-commerce marketplaces. If we add, for instance, online travel intermediaries, the figures above can reach much higher numbers.

Again, according to Euromonitor, the retail value of online travel intermediaries (including air, attractions, hotel, other lodging and short-term rentals, car rental and other transportation intermediaries) in 22 EU countries¹⁴ was € 73.4 billion in 2015. Applying again the assumption of a range between 1% and 10% of unmet potential additional turnover in a scenario without UTPs, this would amount to an additional **€ 0.7 billion to € 7.3 billion** in retail value in online travel intermediation per year.

App stores

According to Vision Mobile¹⁵, in 2014 there were in Europe 406 thousand professional app developers, with an aggregated revenue of € 16.5 billion. These developers supported 667 thousand direct jobs and around 1 million total jobs (including indirect jobs). In a survey of 673 app developers by the Application Developers Alliance¹⁶, 25% of respondents view the app stores themselves as their greatest threat.

Using the same approach as before, we can assume that the uncertainty generated by opaque practices by the most important app stores undermines the full potential of the EU app economy. In this case, the missed range of 1% to 10% of turnover would generate an additional **€ 0.2 billion to € 1.7 billion** in additional turnover. This figure is conservative because the data refers to 2014¹⁷, and although we do not have more precise and recent figures, turnover in the industry has been growing at high rates.

In this case, this would imply, if the average size of a professional developer remains unchanged, an increase of about 40 thousand new app developers, along with 50 thousand additional direct jobs and more than 100 thousand total jobs.

Online advertising

In the EU, online advertising increased to € 36.2 billion in 2015, of which € 5.7 billion correspond to programmatic¹⁸. According to a survey by AppNexus¹⁹, programmatic advertising is already used by 67% of digital advertisers, but only 15% of professionals active in advertising trust programmatic advertising. In addition, 57% considers the relationship with service providers in the programmatic advertising value chain not transparent, 42% also considered the lack of transparency on where advertisements will be displayed as a challenge (2015 IAB/AppNexus survey of 1 232 advertisers, publishers and adtech professionals)

From the figures provided by IAB Europe, a missed range between 1% to 10% of potential turnover in programmatic advertising in Europe due to unfair practices would represent **€ 0.06 billion to € 0.6 billion** in additional revenue. These values are conservative due to the range of impact assumed and since the figures are not very recent. Similarly, due to the increasing penetration of online advertising and the growing importance of programmatic advertising, we would expect the turnover in the industry to have increased significantly since then.

¹⁴ Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.

¹⁵ Vision Mobile, The European App Economy 2014.

¹⁶ Application Developers Alliance (2016), Competition in the Mobile App Ecosystem. Global survey of 673 Mobile App Publishers and Developers.

¹⁷ Unfortunately, a similar report produced for the year 2015 does not provide figures about turnover.

¹⁸ IAB Europe.

¹⁹ AppNexus (2015), Examining attitudes towards programmatic across the global advertising ecosystem.

Social networks

Finally, the role of social networks is more difficult to assess. This is so because from a business perspective, social networks are used to increase brand awareness, to expand the potential customer base, to promote sales, both offline and online, and stimulate app usage, for instance. Hence, social networks have a horizontal and indirect effect over the other three categories²⁰.

In this case, the assumption is that there is going to be an additional impulse to marketplaces through the impact of social networks on the promotion of online sales; an effect on app stores due to its use in the promotion of apps; and an impact on online advertising through their role on brand awareness and on the engagement and expansion of the customer base.

The assumption is that the three impacts computed before would be magnified again by a range between 1% to 10% if trust towards social networks would increase. However, the impact would not be direct, since the effect of social networks is likely to be more pronounced for online advertising, then for marketplaces and finally for app stores. In this case, we compute a weighted measure of the likely impact of social networks when the impact goes through the other categories of platforms. In order to determine the effect of social networks on the other categories of platforms, we computed the proportion of internet traffic from social networks to the other categories. Implicitly, our assumption is that there is a correlation between traffic and the economic impact of social networks. Using data from Similarweb²¹, we found the following weights: 0.55 for online advertising, 0.3 for marketplaces, and 0.15 for app stores.

Using these proportions and the range of impacts from 1% to 10%, we compute the resulting impact of social networks as: $(1.3 \cdot 0.3) + (0.2 \cdot 0.15) + (0.06 \cdot 0.55)$ and $(12.8 \cdot 0.3) + (1.7 \cdot 0.15) + (0.6 \cdot 0.55)$, resulting in an estimated impact of social networks of **€ 0.4 billion to € 4.4 billion**.

Summary of impacts

If we sum all the figures calculated above, we have an aggregated impact in the EU economy due to the uncertainty derived from opaque practices by online platforms in the range of **€ 2.0 billion** and **€ 19.5 billion per year**. These calculations are rough and only intended to give an approximate figure of the impact. More detailed data and more precise methodologies would be required to produce more accurate estimations.

²⁰ Social commerce, i.e., the direct effect of social media on e-commerce is still relatively low. In Spain, for instance, according to eMarket Services, only 14% of social media users shopped directly on social media networks in 2013; 74% of them have made purchases on Facebook, a phenomenon termed F-Commerce.

²¹ www.similarweb.com

5 Firms' choice of online channel

Online platforms operate in different activities and firms can use them for different purposes. Before analysing with more detail the specific decisions to use different types of platforms, the basic question is to understand the decision to use platforms in the first place. In this section, we offer some evidence related to the firms decision to use platforms.

For this section, we rely on the data collected in the Flash Eurobarometer 439 on "**The use of online marketplaces and search engines**" to analyse the decision of firms to join a platform. The survey gathered the replies of 4904 firms in ten countries and seven different sectors about their online activities and in particular on their perceptions about the usefulness of the platforms and the fairness of their terms and conditions.

In the survey, 1821 firms (37%) declare to sell their products and/or services on the Internet. However, only 358 do it on a permanent basis and as much as 617 declare to do it only rarely.

5.1 Platforms in the firm's online strategy

The first question to be addressed is the firms' decision to use different channels to operate online. These decisions are not mutually exclusive since some firms can use several channels. Concretely, using the data from Flash Eurobarometer 439, we can distinguish between own website, platforms, and search engines.

These binary decisions (yes/no) indicate the use or not of one of the available online channels. In order to explain these choices, we use variables that include firms' characteristics and additional variables capturing the firms' perceptions about the usefulness of two online tools, search engines and rating systems. Among the characteristics of firms, we include as explanatory variables size defined by the number of employees, a categorical variable indicating the volume of sales, firm age, variables indicating if the firm is selling in other EU markets and in markets outside the EU, and also indicators for selling to consumers, business and/or governments.

In addition, we include two sets of results including variables related to the perceptions about the usefulness of search engines and rating systems. First, questions related to search engines refer to general and also specialist search engines integrated in marketplaces, and include queries about the firms' appraisal of: i) the importance of the position in the search results; ii) the use of search engine optimisation; iii) if search engines should be allowed to modify their search rankings to suit their commercial interests, and; iv) the existence of reliable dispute resolution mechanisms in case of problems with the search engine. Second, questions related to the users' rating systems collect the firms' perception about: i) the importance of reviews on sales; ii) the veracity of the reviews, and; iii) the possibility to report and remove false reviews.

The results are presented below (please see Annex 1 for details on the specification of the estimation procedure). Table 1 relates the decision to use a channel with firms' characteristics exclusively. Table 2 adds to the previous specification the variables associated with the perceived usefulness of search engines. Finally, table 3 introduces the indicators related to the alleged utility of rating systems.

Table 1. Strategic channel choice.

	Website	Platform	Search Engine
Size	0.00217 (0.00202)	0.000476 (0.00123)	0.00126 (0.00153)
Sales	0.0398 (0.0463)	0.0767** (0.0338)	-0.0286 (0.0401)
Age	0.138 (0.133)	-0.0503 (0.0960)	0.129 (0.113)
EU	0.139 (0.109)	0.268*** (0.0784)	0.268*** (0.0929)
RoW	0.247 (0.154)	0.150 (0.0980)	0.110 (0.119)
B2C	-0.0582 (0.117)	0.245*** (0.0843)	0.125 (0.0974)
B2B	-0.0638 (0.122)	0.0222 (0.0902)	0.0751 (0.105)
B2G	0.229** (0.105)	0.0815 (0.0754)	0.0142 (0.0877)
Constant	0.824*** (0.261)	-1.143*** (0.202)	0.298 (0.224)

Notes: 1465 observations. Size is defined by the number of employees; sales is a category ranging from 1 (less than € 100k) to 5 (more than € 10M); EU is a dummy variable equal to 1 if the firm sells to other EU countries; RoW is equal to 1 if the firm sells to countries outside the EU, B2C is equal to 1 if the firm sells to consumers, B2B is equal to 1 if the firm sells to businesses, B2G is equal to 1 if the firm sells to governments. Estimation includes sector and country dummies. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The estimation results shown in Table 1 reveal some interesting aspects of the firms' online channel choice. First, size and age are not correlated with the decision to use any of the available channels. Second, firms with larger volumes of sales are more likely to use platforms than the other channels. Third, with respect to sales in the domestic market, firms with sales to other EU countries are also more likely to rely on platforms and search engines than their own website. In this case, firms declaring to sell outside the EU do not have a different probability of using a channel than firms selling in the domestic market. Finally, firms selling to consumers are more likely to use platforms, while those selling to governments are more likely to use their own website.

Many of these results are maintained when the variables related to search engines are added (Table 2). In this case, more sales, sales to other EU countries, and firms doing B2C are more likely to use platforms. Here, firms declaring that the position in the search results is important are more prone to adopt any online channel. However, the effect seems to be lower in the case of platforms than for the other two channels. Conversely, firms using search engine optimisation techniques are more likely to use search engines than other online channels. Firms that agree with the statement that search engines should be allowed to change the order in which they display results to suit their own commercial interests are as well more likely to use platforms as their online channel. Finally, firms declaring that there is a reliable dispute resolution mechanism to solve problems are less likely to rely on platforms and/or search engines, but more likely to use their own websites.

Table 2. Strategic channel choice: search engines.

	Website	Platform	Search Engine
Size	6.79e-05 (0.00267)	0.00103 (0.00179)	-0.00134 (0.00239)
Sales	0.0799 (0.0650)	0.0952** (0.0440)	0.0157 (0.0612)
Age	0.269 (0.187)	-0.0240 (0.122)	0.214 (0.184)
EU	-0.0130 (0.144)	0.183* (0.0998)	0.410*** (0.147)
RoW	0.212 (0.191)	0.191 (0.124)	0.0157 (0.186)
B2C	-0.0851 (0.162)	0.223** (0.110)	-0.0425 (0.154)
B2B	0.0202 (0.164)	0.0637 (0.115)	-0.0438 (0.161)
B2G	0.153 (0.139)	0.204** (0.0966)	-0.204 (0.134)
Position	0.435*** (0.146)	0.293*** (0.110)	0.443*** (0.137)
SEO	0.160 (0.143)	0.228** (0.103)	0.694*** (0.137)
Ranking	0.0416 (0.135)	0.174* (0.0941)	0.211 (0.129)
Dispute resolution	0.224* (0.129)	-0.168* (0.0907)	-0.373*** (0.126)
Constant	0.0461 (0.373)	-1.430*** (0.283)	0.423 (0.382)

Notes: 1465 observations. Size is defined by the number of employees; sales is a category ranging from 1 (less than € 100k) to 5 (more than € 10M); EU is a dummy variable equal to 1 if the firm sells to other EU countries; RoW is equal to 1 if the firm sells to countries outside the EU, B2C is equal to 1 if the firm sells to consumers, B2B is equal to 1 if the firm sells to businesses, B2G is equal to 1 if the firm sells to governments; Position is equal to 1 if the firm indicates that its position in search results has a significant impact on sales; SEO is equal to 1 if the firm uses Search Engine Optimisation to appear high in search rankings; Ranking is equal to 1 if the firm agrees with the idea that search engines should be allowed to change the order in which they display results to suit their own commercial interests; Dispute resolution is equal to 1 if the firm declares there is a reliable dispute resolution system in case of disputes with search engine operators. Estimation includes sector and country dummies. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The last set of results includes in the list of explanatory variables some indicators about the usefulness of rating systems (Table 3). Again, the main results regarding firms' characteristics are maintained. Regarding rating systems, the results indicate that firms declaring that the reviews they receive have a significant impact on their sales will adopt all three online channels with a higher probability than firms that do not. However, in this case, this probability is higher for adopting platforms than for adopting any other channel considered. Although there is no effect related to the honesty of the reviews, firms declaring that they agree with the statement that they can report false reviews and have them removed are less likely to adopt platforms as their online channel.

Finally, the results also point to the possible existence of complementarities between platforms and search engines as channels by means of which firms can carry out their online operations. In the three sets of estimations, the correlation coefficients of the error terms are positive and highly significant (Table 4). These results support the existence of interdependencies between platforms and search engines. In contrast, there is no such interdependence between the decisions to use firms' own website and the use of platforms or search engines. The correlation coefficients are positive and statistically significant only in the first specification, and show very low values. Indeed, the decision as to whether invest in the own website or to select other means is an independent one,

which would suggest that the two decisions pursue different strategic objectives. However, caution must be exercised in this analysis of potential interdependence, since we do not formally test the existence of complementarities. Moreover, correlations may also be found if there were unobservable firm-specific factors affecting the decisions.

Table 3. Strategic channel choice: rating systems.

	Website	Platform	Search Engine
Size	0.00107 (0.00222)	-0.00169 (0.00141)	0.000594 (0.00176)
Sales	0.0993* (0.0561)	0.0837** (0.0400)	-0.0385 (0.0490)
Age	-0.0189 (0.145)	-0.160 (0.111)	0.143 (0.143)
EU	0.173 (0.128)	0.267*** (0.0917)	0.316*** (0.117)
RoW	0.228 (0.172)	0.165 (0.114)	0.0572 (0.148)
B2C	0.00187 (0.145)	0.183* (0.102)	0.00984 (0.127)
B2B	-0.0154 (0.145)	0.0782 (0.104)	-0.0200 (0.129)
B2G	0.106 (0.123)	0.164* (0.0890)	0.0301 (0.109)
Reviews	0.266** (0.115)	0.462*** (0.0861)	0.389*** (0.101)
Genuine	0.0690 (0.115)	0.0500 (0.0860)	0.0241 (0.103)
Report	0.0314 (0.118)	-0.168* (0.0867)	-0.0943 (0.107)
Constant	0.364 (0.363)	-0.974*** (0.272)	0.568* (0.327)

Notes: 1465 observations. Size is defined by the number of employees; sales is a category ranging from 1 (less than € 100k) to 5 (more than € 10M); EU is a dummy variable equal to 1 if the firm sells to other EU countries; RoW is equal to 1 if the firm sells to countries outside the EU, B2C is equal to 1 if the firm sells to consumers, B2B is equal to 1 if the firm sells to businesses, B2G is equal to 1 if the firm sells to governments; Reviews is equal to 1 if the firm declares that reviews about the firm on online platforms have a significant impact on sales; Genuine is equal to 1 if the firm declares that, in general, users' reviews are genuine; Report is equal to 1 if the firm declares that false reviews about the firm can be reported and removed. Estimation includes sector and country dummies. Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4. Channel complementarity.

	Platform	Search engine
Website	0.0842* (a)	0.148** (a)
Platform		0.379*** (a)
		0.259*** (b)
		0.315*** (c)

(a) From table 1; (b) From table 2; (c) From table 3.

5.2 The decision to use a platform

In this section, we move from the more general question of channel choice to the specific question of platform choice. In so doing, we need to focus on two different but related

questions. The first one is related to the decision to use a platform or not. The second is, conditional on having opted for using a platform, what's the intensity of use of the chosen platform. Hence, by definition we face a selection bias issue: only those firms using a platform will be in a condition to indicate how much they are using it. Some econometric techniques take this particular feature into account, and the one used here is described in Annex 2.

The results shown below are composed of two sets of coefficients. The columns labelled **Decision** show the determinants of the decision to join a platform. The columns labelled **Intensity**, indicate the factors that shape the decision to use a platform more intensively. Intensity in this case is defined as a categorical variable that can take four different values: i) rarely; ii) sometimes; iii) most of the time; and iv) always²². The information included in the Flash Eurobarometer 439 allow us to analyse these decisions from two different perspectives. The first one refers to how the perception of the fairness of the terms and conditions of the platform affect intensity of use (Table 5). The second approach includes the firms' perceptions of the data usage by the platform (Table 6). In both cases, we add additional control variables related to the firms' perceptions about the usefulness of search engines and rating systems.

Some results are in line with those obtained in the previous section. For instance, if we look at the effects of firms' characteristics²³, size and age are neither relevant in the decision to use a platform, nor in the intensity of usage. However, firms with sales to other EU countries are more likely to operate with platforms, but its effect on intensity is less clear. What tables 5 and 6 confirm is that firms selling to consumers are more likely to use platforms. However, its effect on intensity is also ambiguous.

The effects of search engine effectiveness on the choice and intensity of usage of platforms are as follows. The position in the search rankings is not correlated with either adoption or intensity. Similarly, firms declaring to use Search Engine Optimisation tools are more likely to use platforms, but this perception is not associated with a more intensive use of the platform. There is no relationship –neither with the choice nor with the intensity- of the perception of firms that search engines should be allowed to change the order in which they display their results to suit their commercial interests. The results also indicate that firms declaring that there is a reliable dispute resolution mechanism to solve problems are less likely to use platforms, but this effect is null for intensity of usage.

Additional results refer to the effect of the explanatory variables about the usefulness of rating systems. In this case, firms declaring that the reviews they receive do not have a significant impact on their sales are less likely to use platforms, and also less likely to use them more intensively. As before, there is no effect related to the honesty of the reviews neither for the decision to use a platform nor for the intensity of use. Finally, firms declaring that they agree with the statement that they can report false reviews and have them removed are less likely to decide to use platforms. This variable has no impact in the intensity of use.

So far we have analysed two interrelated issues: adoption (also known as the extensive margin) and intensity of use (referred to the intensive margin). From the results discussed in the previous paragraphs, we observe that the factors associated with search engines effectiveness and rating systems captured by the questionnaire (and by no means exhaustive), are associated with the extensive margin, i.e., they are more likely to be correlated with the decision to adopt platforms as online service providers, than with the decision to use these platforms more intensively.

²² This characteristic requires the use of an estimation procedure that takes into account this categorical definition of the dependent variable. See the notes in tables 5 and 6 for more information and also Annex 2.

²³ Not shown to save space, but available upon request.

Table 5. The decision to join a platform and the intensity of use, terms and conditions.

	(1)	(2)	(3)	(4)	(5)	(6)
	Intensity	Decision	Intensity	Decision	Intensity	Decision
B2C	0.322 (0.327)	0.284*** (0.0786)	0.233 (0.535)	0.248*** (0.0857)	0.393*** (0.128)	0.193*** (0.0658)
B2B	0.211*** (0.0808)	-0.0599 (0.0630)	0.104 (0.144)	-0.0238 (0.103)	0.0966*** (0.0363)	-0.00982 (0.0956)
B2G	0.0469 (0.0877)	0.0716 (0.0575)	0.0150 (0.139)	0.136* (0.0736)	0.132 (0.112)	0.164* (0.0993)
Clear	0.130 (0.105)		0.216** (0.103)		0.169** (0.0785)	
Negotiate	-0.0374 (0.0877)		-0.0228 (0.0745)		-0.0366 (0.0944)	
Switch	0.0235 (0.0739)		0.0665 (0.126)		0.0102 (0.0539)	
Dispute	0.189*** (0.0667)		0.181** (0.0747)		0.121 (0.0830)	
Position			0.222 (0.248)	0.234 (0.157)		
SEO			0.00269 (0.296)	0.265* (0.136)		
Ranking			0.0507 (0.0724)	0.0573 (0.0753)		
Dispute res.			-0.0845 (0.206)	-0.151** (0.0665)		
Reviews					0.494*** (0.125)	0.488*** (0.0721)
Genuine					-0.0135 (0.0652)	0.00105 (0.0523)
Report					-0.0642 (0.127)	-0.207*** (0.0454)
Observations	822	1,328	439	883		1,149

Notes: Ordered probit with sample selection estimation. The constant for the selection equation and the cut points for the intensity equation are not shown. B2C is equal to 1 if the firm sells to consumers, B2B is equal to 1 if the firm sells to businesses, B2G is equal to 1 if the firm sells to governments; Clear is equal to 1 if the firm declares that the terms and conditions are clear; Negotiate is equal to 1 if the firm can influence or amend the terms and conditions; Switch is equal to 1 if the firm declares that can easily switch to a different marketplace if the existing terms and conditions are changed for worse; Dispute is equal to 1 if the firm declares that there is a reliable dispute resolution system to solve disputes with online marketplaces; Position is equal to 1 if the firm indicates that its position in search results has a significant impact on sales; SEO is equal to 1 if the firm uses Search Engine Optimisation to appear high in search rankings; Ranking is equal to 1 if the firm agrees with the idea that search engines should be allowed to change the order in which they display results to suit their own commercial interests; Dispute resolution is equal to 1 if the firm declares there is a reliable dispute resolution system in case of disputes with search engine operators; Reviews is equal to 1 if the firm declares that reviews about the firm on online platforms have a significant impact on sales; Genuine is equal to 1 if the firm declares that, in general, users' reviews are genuine; Report is equal to 1 if the firm declares that false reviews about the firm can be reported and removed. Estimation includes sector and country dummies. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

We now focus on the results related to the firms' perceptions about the terms and conditions offered by the platform and about the use of data on the intensity of use of the platform. Table 5 shows the results for terms and conditions. These results indicate that companies using online marketplaces that declare that the terms and conditions for online marketplaces are not clear are likely to use platforms less intensively. This is not observed, however, in the set of results that do not include the characteristics of the usefulness of search engines or rating systems. No relationship was found between the possibility to influence or amend the terms and conditions and the intensity of use of the platform. Firms declaring that they can easily switch to a different online marketplace if the existing terms and conditions are changed for worse, are not likely to use the platform more intensively. Finally, companies declaring that there is not a reliable dispute resolution system that they can use if they have a dispute with an online marketplace are using platforms less intensively than others. Hence, ***the lack of clarity about the terms and conditions and also the lack of a reliable dispute resolution mechanism are correlated with a lower intensity of use of the platform.***

Results referred to the usefulness and availability of customers' data (Table 6), show that companies using online marketplaces that disagree with the statement that the information they receive through the online marketplace about the behaviour and preferences of their customers is useful for the development or improvement of their products or services use platforms less intensively. This result is strong and consistent in all the different specifications. Firms that declare that they do not get the data they need about their customers from online marketplaces, are likely to use platforms less intensively. No association has been found between firms that indicate that they know the data being collected by the online marketplace about the activity of their company and how the data is used, with intensity of platform use. Finally, companies that disagree with the statement that the transfer of key commercial data from one online marketplace to another is easy are more likely to use platforms less intensively. ***Results then indicate that concerns about access to data and portability are associated to a lower intensity of use of platforms.***

To confirm the results from these exercises, we conducted additional analysis. In order to do so, we rely now on the data coming from the Ecorys surveys. In this case, platform users also indicate how intensively they use the platform. In this case, the variable adopts several values referred to the proportion of turnover that is generated via online platforms. The categories defined are as follows: i) not applicable and/or marginal turnover; ii) less than 1/3; iii) from 1/3 to 1/2; iv) from 1/2 to 2/3; and v) more than 2/3. As explanatory variables we added size, total turnover, and country and sector indicators. Results are presented in table 7.

The table indicates that firms declaring that they disagree or strongly disagree with the statements associated with fair practices by platforms are less likely to have a larger turnover coming from the operations with the platform. These statements refer to: i) the possibility to receive help and guidance regarding issues encountered in the experience with platform; ii) the clarity of the contractual terms, conditions and related practices of the platform; iii) the ability to negotiate or tailor the contractual terms and conditions to the needs of the companies; and finally, iv) the fairness of the contractual terms, conditions and related practices. Not surprisingly, firms declaring that platforms are important or very important are more likely to use the platforms more intensively. The results also indicate a positive association between platform usage and the likelihood of declaring problems with the platform.

Table 6. The decision to join a platform and the intensity of use, data.

	(1) Intensity	(2) Decision	(3) Intensity	(4) Decision	(5) Intensity	(6) Decision
B2C	0.304* (0.169)	0.232** (0.105)	0.282 (0.210)	0.207*** (0.0786)	0.326** (0.151)	0.170** (0.0723)
B2B	0.159* (0.0883)	-0.0632 (0.0690)	0.108* (0.0623)	-0.0345 (0.109)	0.171** (0.0714)	0.0243 (0.0702)
B2G	0.0335 (0.0867)	0.0604 (0.0518)	0.0588 (0.0808)	0.124 (0.0791)	0.0409 (0.106)	0.121* (0.0727)
Info	0.413** (0.175)		0.457* (0.243)		0.433* (0.232)	
Data use	0.162* (0.0836)		0.163* (0.0842)		0.161* (0.0828)	
Data collect	0.111 (0.0681)		0.0672 (0.0732)		0.0707 (0.0926)	
Portability	0.186*** (0.0475)		0.144** (0.0712)		0.101 (0.0884)	
Position			0.210 (0.206)	0.325** (0.150)		
SEO			0.0678 (0.170)	0.211* (0.122)		
Ranking			0.131 (0.0960)	0.0434 (0.0767)		
Dispute res.			-0.126 (0.129)	-0.173** (0.0731)		
Reviews					0.176 (0.115)	0.527*** (0.0944)
Genuine					0.0700 (0.0733)	0.0263 (0.0508)
Report					0.00208 (0.131)	-0.221*** (0.0535)
Observations	822	1,382	439	879	553	1,038

Notes: Ordered probit with sample selection estimation. The constant for the selection equation and the cut points for the intensity equation are not shown. B2C is equal to 1 if the firm sells to consumers, B2B is equal to 1 if the firm sells to businesses, B2G is equal to 1 if the firm sells to governments; Info is equal to 1 if the firm declares that the information received through online marketplaces is useful for the development or improvement of products and/or services; Data use is equal to 1 if the firm declares to receive the data collected by the online marketplace about the firm's customers; Data collect is equal to 1 when the firm declares to know what data are collected by the online marketplace about the activity of the firm and how it is used; Portability is equal to 1 when the firm states that the key commercial data can be transferred to another online marketplace; Position is equal to 1 if the firm indicates that its position in search results has a significant impact on sales; SEO is equal to 1 if the firm uses Search Engine Optimisation to appear high in search rankings; Ranking is equal to 1 if the firm agrees with the idea that search engines should be allowed to change the order in which they display results to suit their own commercial interests; Dispute resolution is equal to 1 if the firm declares there is a reliable dispute resolution system in case of disputes with search engine operators; Reviews is equal to 1 if the firm declares that reviews about the firm on online platforms have a significant impact on sales; Genuine is equal to 1 if the firm declares that, in general, users' reviews are genuine; Report is equal to 1 if the firm declares that false reviews about the firm can be reported and removed. Estimation includes sector and country dummies. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Table 7. UTPs and platform usage.

	(1)	(2)
Unfairness	-0.466*** (0.0861)	-0.296*** (0.0901)
Importance	1.149*** (0.0843)	0.893*** (0.0881)
Problem	1.280*** (0.0879)	0.851*** (0.0928)

Note: 2553 observations. Estimation includes size, total turnover, sector and country dummies. Column (2) in addition, includes indicators for type of platform used by the firm (marketplace, app store, social network, online advertising). Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Finally, we look at the distinction between revealed and deterring factors in the intensity of use of platforms. When firms make decisions to implement new strategies, contract new services or adopt and use new technologies, they are most likely to confront a number of challenges and experience different types of barriers. Starting with some seminal contributions in the economics of innovation literature (see for instance D'Este et al., 2012) it became necessary to distinguish between two types of barriers. The first corresponds to what has been described as revealed barriers, reflecting the degree of difficulty of the chosen process and the learning experience consequent on the firm engaging on it. The second type, which has been labelled as deterring barriers, encompasses the obstacles that prevent firms from committing to their decision. With the data at hand, we can investigate the relationship between firms' engagement with platforms and their assessment of the barriers to use these online service providers.

Firms in the Ecorys survey that replied to disagree or strongly disagree with the statements associated with fair practices by platforms were asked to identify the reasons for unfairness. Hence, controlling for the perception of the existence of unfair practices, we check which reasons or factors are deemed to be deterring a more intensive use of the platform and which factors have a revealed nature, i.e., they become apparent due to a more intense use. Table 8 shows the results for the intensity equation²⁴.

We found that, among the ten different factors identified in the questionnaire, five turn out to be revealed barriers, i.e. there is a positive correlation between the probability of declaring that those particular factors are important, and the intensity of platform use. These factors are: i) the possibility of one-side changes to the pricing and/or other terms and conditions by the platform; ii) unfair pricing; iii) limited access to dispute resolution; iv) limitations on access and/or use of customer data; and v) termination policy. The other five factors are of a deterring nature. This means that they act as obstacles to a more intense use of the platforms. However, three of these – the impossibility to negotiate or amend the terms and conditions, the limitation of payment possibilities, and the limitations on portability of data- are not statistically significant. The other two, namely language difficulties, which include issues such as difficult or unclear language and the fact that the terms and conditions are only available in foreign language, and biased or non-transparent search practices, turned out to be statistically significant meaning that they are negatively correlated with usage.

²⁴ The selection equation that investigates the determinants of declaring the terms and conditions of the platform unfair are not presented to save space, but are available upon request.

Table 8. Revealed vs. deterring UTPs.

	(1)	(2)	(3)	(4)
No possibility to negotiate or amend the terms and conditions	-0.160 (0.179)	-0.145 (0.185)	-0.185 (0.192)	-0.157 (0.192)
Possibility of one-side changes to the pricing and/or other terms and conditions by the platform	0.314* (0.163)	0.346*** (0.131)	0.355*** (0.0985)	0.378*** (0.0870)
Unfair pricing	0.367** (0.145)	0.366*** (0.108)	0.387*** (0.0560)	0.375*** (0.0399)
Limitation of payment possibilities	-0.0401 (0.153)	-0.0723 (0.155)	0.00957 (0.110)	-0.0394 (0.109)
Limited access to dispute resolution	0.217** (0.110)	0.196*** (0.0720)	0.261*** (0.0725)	0.226*** (0.0522)
Language difficulties	-0.391** (0.186)	-0.369** (0.166)	-0.391** (0.186)	-0.356** (0.168)
Limitations on access and/or use of customer data	0.235** (0.115)	0.224* (0.117)	0.244*** (0.0410)	0.226*** (0.0644)
Limitations on portability of data	-0.115 (0.0844)	-0.177 (0.148)	-0.136 (0.0881)	-0.195 (0.136)
Biased or non-transparent search practices	-0.364*** (0.0508)	-0.396*** (0.0886)	-0.340* (0.184)	-0.374* (0.200)
Termination policy	0.118** (0.0577)	0.150*** (0.0389)	0.0854 (0.0607)	0.122** (0.0593)

Note: Ordered probit with sample selection estimation. The results from the selection equation are not shown. Columns (1) and (3) include sector and country dummies. Columns (2) and (4) include size, total turnover, sector and country dummies. Columns (3) and (4) include platform type dummies. Robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

6 Firms operating with platforms

The previous sections have focused on the role of platforms in the overall online channel strategy of companies, on the factors that determine the decision to use a platform, and on the intensity of use. In this section we adopt a similar approach to look at the choice of platform category of firms already operating with platforms. For this section, we rely on the survey data provided by the TNS Panel within the Ecorys project described in section 3.

The survey distinguishes four different categories of platforms: marketplaces, app stores, social networks and online advertising platforms. The first task is then to analyse the firms' decisions to join several platforms at the same time. We will perform this analysis with two different approaches. First, we will describe the data included in the surveys. Second, we will take a statistical approach. Finally, in this section, we also look at the delineation of market boundaries in the European online platforms ecosystem by analysing the firms' decisions to join the platforms selected in the surveys.

6.1 Do firms multi-home?

From an economics perspective, it has been long recognized that platforms have the tendency to tip (Caillaud and Jullien, 2001) given the positive cross-group external effects between buyers and sellers. However, in several industries more than one platform has positive market shares. A possible explanation is that platforms offer differentiated services and, therefore, are active in the market (Rochet and Tirole, 2003; Armstrong, 2006). When platforms compete, the behaviour of each group of participants becomes relevant. If both sides multi-home (both buyers and sellers join only one of the existing intermediaries), platforms will be responsive to network effects. However, in a context where one side can multi-home (i.e., be active in more than one platform) while the other group single-homes, the interests of the group that multi-homes are ignored by the platform, since its business will ultimately depend on the number of participants in the other side, for which it will compete fiercely with other intermediaries. This is the "competitive bottleneck" model.

A similar outcome can be reached when the platforms are not necessarily differentiated (Karle et al., 2016). In a context of homogeneous platforms, the key variable is the intensity of competition on the sellers' side. If competition between sellers is soft, only agglomeration equilibria exist, i.e. all sellers and buyers single-home. By contrast, if competition between sellers is moderate or fierce, sellers multi-home (and buyers can too), and sellers enjoy a monopoly position vis-à-vis buyers. This allows platforms to obtain also positive profits.

From the above discussion we can derive testable hypothesis related to the relationships established by platforms and sellers that we can tackle with the available data. A first question would be: do sellers multi-home?

To answer this question, from both the surveys and the panel we have calculated the number of platforms the respondents declare to use as a means to get to the final consumers/users. Tables 9a and 9b below shows the aggregated proportions for the two different sources:

Table 9a. Single- vs. multi-homing, overall results.

	Panel	Surveys
Proportion single-homing	13.3	3.6
Proportion multi-homing	86.7	96.4
Total	100.0	100.0

Source: own elaboration with data from TNS Panel and Ecorys surveys.

The data clearly shows that a big proportion of firms is multi-homing, i.e., they operate with several platforms at the same time. More strikingly, considering the four different categories of platforms included in the study (marketplaces, app stores, social media and online advertising platforms), 77% of firms are active in at least 2 of them and 35% of firms are active in all four categories. By categories, we also see that most sellers multi-home:

According to the economic theory of platforms, more specifically the competitive bottleneck model, multi-homing is associated with the probability to face problems with platforms. To validate this argument, we have conducted some econometric analysis to determine the probability of facing a problem with a platform, and controlling for several firm characteristics, including multi-homing. Table 10 shows that the probability of facing a problem with a platform is positively correlated with firms' multi-homing.

Table 9b. Single- vs. multi-homing, by category.

	E-commerce	Apps	Social networks	Online advertising
Single-homing				
Panel	34.2	46.6	34.9	47.0
Survey	25.5	38.3	24.9	41.7
Multi-homing				
Panel	65.8	53.4	65.1	53.0
Survey	74.5	61.7	75.1	58.3

Source: own elaboration with data from TNS Panel and Ecorys surveys.

The table show that firms that multi-home are more likely to face problems with platforms. This may be consistent with a "competitive bottleneck" explanation. Platforms may be differentiated and when sellers multi-home, they perceive that the sellers' decision to join one platform or the other are independent decisions as long as their expected benefit is positive. In this sense, there is no competition between platforms to attract sellers and each platform acts as a monopolist towards them. Under this scenario the platforms do not care about the sellers interests, and this may explain the existence of unfair trading practices (UTPs)²⁵. This result is robust to the inclusion of the "dependency" of the seller to the platform, measured by the proportion of the seller's turnover generated with the platform.

However, an alternative explanation is that platforms are not differentiated but homogeneous. In this case, we could observe a similar outcome when the intensity of competition between sellers forces them to multi-home to segment the market and keep their market power over buyers. In order to test this hypothesis, we run a regression again relating multi-homing decisions and a measure of competition in the markets. For this latter variable, we divided the sample of firms in two groups, depending on their turnover generated by means of platforms. For heavy users, the assumption is that they will face competition by all the firms that are also present in the same platform categories. For light users, we assume that competition is more of a local nature, and then we compute the number of firms in the same sector and in the same country than the corresponding firm. The results of this exercise are presented in Table 11 below.

²⁵ See table A1 in Annex 4 for a list of the main unfair practices identified in the study.

Table 10. Relationship between multi-homing and problems with platforms.

Dependent variable: (Q14) In the course of your business relationship with the indicated online platforms, has your company ever experienced any problems or disagreements with the platforms? (Yes/No)				
Multi-homing (Yes/No)	1.475***	1.415***	1.304***	1.303***
	(0.163)	(0.167)	(0.169)	(0.169)
Constant	-1.867***	-1.794***	-2.251***	-1.859***
	(0.157)	(0.177)	(0.193)	(0.308)
Controls				
Size	No	Yes	Yes	Yes
Sector	No	No	Yes	Yes
Country	No	No	No	Yes

Observations=2541. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.
Source: own elaboration with data from TNS Panel and Ecorys surveys.

Table 11. Relationship between the intensity of competition and multi-homing.

Dependent variable: Multi-homing (Yes/No)				
Competition	0.00191***	0.00190***	0.00190***	0.00193***
	(0.000110)	(0.000110)	(0.000111)	(0.000114)
Constant	-4.243***	-4.406***	-4.028***	-4.011***
	(0.282)	(0.298)	(0.521)	(0.545)
Controls				
Size	No	Yes	Yes	Yes
Sector	No	No	Yes	Yes
Country	No	No	No	Yes

Observations=2541. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.
Source: own elaboration with data from TNS Panel and Ecorys surveys.

The table shows that the more intense is the competition faced by the firms in the sample, the more likely it is for firms to multi-home. According to Karle et al. (2016), this rules out the possibility that market tipping occurs. However, when competition is intense, sellers use the platform to avoid competition with their rivals in order to preserve some market power over buyers. This in turn could force platforms to compete against each other driving their profits down. Under these circumstances UTPs could be used as a strategic weapon to punish multi-homing firms for forcing platforms to compete and to drive fees down.

6.2 Which category of platforms firms choose?

The data collected from Ecorys both in the panel and the surveys can be used to analyse the firms' decision to operate with one or several types of platforms. From the firms' responses to the TNS survey, we created four dichotomous variables, indicating whether the firm is using platforms in the different categories. Firms can use several platforms at the same time, and these platforms can be from different categories. One of the purposes of this analysis is to see if the different categories are complementary to each other or, on the other hand, substitutes. For this analysis, we rely in the methodology

already used in section 5.1 but instead of having three choices, now firms face four alternatives, related to the four different categories of platforms analysed. Please refer to Annex 1 for a more detailed explanation of the procedure.

The results obtained are displayed in Table 12 below. As factors affecting firms' decisions we include firms' characteristics such as the volume of turnover from the platform, size, total turnover, country and sector. Given that the results related to country and sector may be confusing and have difficult interpretation, they are not shown in the table below.

Table 12. Choice of platform category.

	Marketplace	App store	Social network	Online advertising
Turnover from the platform				
Marginal ¹	0.0694 (0.0882)	0.0149 (0.0891)	0.812*** (0.160)	0.639*** (0.0903)
Less than 1/3	0.679*** (0.0754)	0.589*** (0.0708)	0.509*** (0.103)	0.805*** (0.0762)
From 1/3 to 1/2	0.994*** (0.115)	1.104*** (0.104)	0.998*** (0.193)	1.197*** (0.122)
From 1/2 to 2/3	1.329*** (0.170)	1.127*** (0.130)	0.954*** (0.223)	1.282*** (0.155)
More than 2/3	1.167*** (0.155)	0.498*** (0.119)	0.347** (0.161)	0.821*** (0.136)
Size				
2-9	0.0756 (0.0705)	0.156** (0.0697)	0.205** (0.0894)	0.305*** (0.0699)
10-49	0.0192 (0.0948)	0.324*** (0.0905)	0.272** (0.123)	0.305*** (0.0946)
50-250	0.0802 (0.111)	0.353*** (0.106)	0.336** (0.150)	0.320*** (0.111)
Turnover (total)				
2M€ - 9.9M€	0.181* (0.0934)	0.249*** (0.0862)	-0.0301 (0.119)	0.0427 (0.0909)
10M€ - 50M€	-0.0229 (0.119)	0.259** (0.112)	-0.0404 (0.155)	0.164 (0.119)
More than 50M€	0.0265 (0.140)	0.344*** (0.133)	-0.115 (0.185)	0.0899 (0.141)
Constant	-0.141 (0.181)	-0.890*** (0.169)	0.309 (0.221)	-0.641*** (0.173)

Notes: 2,553 observations. Marginal means Marginal turnover, but strong reliance on business communication online. Estimation includes sector and country dummies. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

As expected, the more the turnover a firm gets from the platform, the more likely is to operate with platforms. This result is consistent for all platform types and turnover categories. The only exception is the highest category, for which the probability associated is somewhat lower than the previous category. One interesting and consistent result is that firms declaring that their turnover from platforms is marginal but they rely on platforms for online business communication are more likely to use social networks and online advertising, but the effect is null for marketplaces and app stores.

The results regarding size and total turnover are as follows. First, with respect to size, the excluded size category is firms with one employee. The results indicate that the larger the size the higher the probability to operate with platforms in all categories except marketplaces, where different size categories do not have a differentiated effect. Second, total turnover does not have major significant effects. There are, however, two

exceptions. On one hand, firms with total turnover of 2M€ - 9.9M€ are more likely to operate with marketplaces. On the other, total turnover is relevant for firms operating with app stores. Here, the higher the turnover, the higher the probability of establishing business operations with app stores.

As before, the methodology allows identifying the correlation of firms' choices with respect to the different categories of platforms. Table 13 shows these coefficients. In the majority of cases, the decisions to use different types of platforms are complementary strategic decisions by firms. This is particularly relevant for those cases with the highest correlation coefficients, namely, marketplaces and app stores, on the one hand, and app stores and online advertising platforms, on the other. Online advertising complements every other platform choice, and particularly the choice of an app store. Two relevant exceptions to this general complementarity rule are the following: i) the choices of app stores and social networks are strongly independent, as indicated by a close to zero and statistically insignificant coefficient; and ii) marketplaces and social networks are mild substitutes, as indicated by a negative and statistically significant coefficient, although its value is not high.

Table 13. Platform complementarity.

	App Stores	Social Networks	Online Advertising
Marketplaces	0.590***	-0.270***	0.196***
App Stores		-0.0214	0.429***
Social Networks			0.168***

*** p<0.01, ** p<0.05, * p<0.1

6.3 Delineating markets in the European online platforms ecosystem

The difference between the traditional competitive bottleneck model and the homogeneous platforms explanation resides precisely in the degree of perceived differentiation of the different online platforms. In order to see to what extent firms in the sample may perceive platforms as providing differentiated or competing services; we conducted a choice modelling Latent Class Analysis, and determined the optimal number of classes or segments taking into consideration the four categories of platforms simultaneously. Similar analysis at the category level could be also performed.

For the European online platform ecosystem, the analysis determines 2 segments. If we analyse the market penetration by the top 5 platforms, without taking into account the competitive segments, we may have a biased picture of the importance of the different players and the boundaries of the ecosystem. Table 14 shows the market penetration indicator:

Table 14. Market penetration.

Name	Share
Facebook	0.151
Amazon	0.101
YouTube	0.094
Instagram	0.083
VK	0.041

From the table we see clearly the prominence of social networks and media platforms. In the list, Google Play will come is number 6, eBay in number 8, and Google Doubleclick in position 15. However, the methodology employed detects that there are two main segments. The top 10 platforms in each segment and their market penetration indicator on each segment, as well as the weight of each segment in the entire ecosystem, are presented below, table 15.

We notice from table 13 that some platforms are active in more than one segment. Therefore, the online platform ecosystem can be interpreted as having an "overlapping" structure. The first segment consists mostly of social network and media platforms, with some platforms involved in online advertising. This segment represents one quarter (24%) of the ecosystem (for sellers). Market penetration in this segment is quite biased, since Facebook in this case has a share of 27%, and the top 10 reach a penetration of 80%.

The second segment accounts for three quarters of the ecosystem (76%), and is led by Amazon with a share of 13%, followed by Facebook. Here market penetration is not as biased as in the previous segment. However, the top ten players represent 60% of the segment. In this segment platforms such as eBay also from the e-commerce category, and Google Play and Microsoft Windows Store from the app store category appear in the list.

Table 15. Two-segment Latent Class results.

Segment 1		Segment 2	
Name	Share	Name	Share
Facebook	0.273	Amazon	0.133
YouTube	0.139	Facebook	0.113
Instagram	0.129	YouTube	0.079
VK	0.066	Instagram	0.069
Other	0.042	Google play	0.041
LinkedIn	0.036	eBay	0.040
Amazon (ad)	0.032	Microsoft Windows Store	0.037
Yelp ad	0.027	VK	0.033
Facebook (ad)	0.027	Amazon (ad)	0.031
Twitter ad	0.026	LinkedIn	0.026
Top 10 (cumulative)	0.797	Top 10	0.602
Segment share	0.237	Segment share	0.763

Looking at the characteristics of the firms, segment 1 attracts smaller firms, firms that declare that they do not give that much importance into the platforms, and mostly service firms. The opposite would characterise firms in the second segment.

An interesting issue is related to the market overlap. In such a situation, this can lead to a chain of substitution. For example, if platform A and platform B compete in segment 1, and platform B and platform C compete in segment 2, the three platforms will be necessarily interacting because A and B, as well as B and C are directly related, and A and C are indirectly related because they share interactions with a common player. In that sense, all platforms with positive estimated market penetration indicator are potentially indirectly connected. This feature generates a complex set of interactions among agents that is hard to disentangle.

As a final comment, the (partial) results presented here may be interpreted as providing necessary (but not sufficient) conditions for the existence of competitive bottlenecks in the European online platforms ecosystem. These bottlenecks may be behind the existence of UTP vis-à-vis sellers. However, we also provide (necessary but not sufficient) evidence on alternative explanations, based on the intensity of interactions among sellers and the perceived degree of differentiation of platforms.

A more detailed analysis capturing many of the details of this complex ecosystem would require a different setting, more detailed market-level data, and more robust empirical methodologies in order to identify more precisely the details of the strategic interactions among the different actors.

7 Conclusions

Platforms offer significant benefits to firms, whether large or small, by creating new business opportunities through the creation of virtual communities of buyers and sellers and facilitating the interactions of users with complementary interests. Enterprises enthusiastic about expanding their customer base, looking for new markets or interested in selling specialised products may find new opportunities by using online platforms. At the same time, platforms offer new ways of maximising efficiency and improving profitability. However, platforms can abuse their privileged positions to prioritise their own profit maximising strategies over those of the users or the society as a whole. The emphasis on challenges and risks should not ignore the potential benefits.

As explained above, the economic analysis of platforms to date has mostly focused on pricing strategies. Within this literature, some contributions have however started to look beyond purely pricing decisions, although this area is ill-developed. In order to optimise the interactions between its different sides, which in turn maximises its own profits, the platform designs a pricing structure. Depending on the relative strength of competitive forces, it will attract a significant number of participants in each side. However, changes in the characteristics of buyers or sellers could trigger a strategic response from the platform in order to attain a new optimal equilibrium. These changes can have indirect effects on the number of participants in each side of the platform.

Platforms incentives to exclude users –or to enforce minimum standards- can be determined by several considerations. One important issue is related to a fundamental trade-off between the quality and the quantity of participating users. When at least one side of the market values a quality attribute of the other side, the platform may find optimal to sacrifice quantity to a certain degree in order to increase the average quality of the agents in the other side. Similarly, when buyers demand more variety, products become less substitutable and their sellers will be able to extract a larger share of the surplus created by the interaction of the two sides. The platform will seek to extract more profits from sellers, altering the price structure. Under the new setting, some suppliers will not find it profitable to use the platform any more.

The previous theoretical arguments would explain why some platforms engage in unfair trading practices with respect to firms (sellers/suppliers). In its assessment of online platforms, the Commission detected the existence of potentially “unfair” commercial practices, while utilisation of the platforms clearly provides benefits for the users. The net effect is unclear, and calls for empirical evidence. In this report, we have tried to collect enough evidence to corroborate some of these claims.

The results presented here indicate that the aggregated impact in the EU economy due to the uncertainty derived from opaque practices by online platforms can be in the range from € 2.0 billion to € 19.5 billion per year. Even if these calculations are very simplistic, they already give an approximate figure of the impact. More detailed data and more precise methodologies would be required to produce more accurate estimations.

We first analyse the choice of platforms as a distribution channel. The results indicate that firms with larger volumes of sales, firms with sales to other EU countries, and firms selling to consumers (B2C) are more likely to use platforms. These results are consistent across different specifications introducing, first, variables associated with the perceived usefulness of search engines and, second, indicators related to the usefulness of rating systems. In this case, firms using search engine optimisation techniques and those that agree with the statement that search engines should be allowed to change the order in which they display results to suit their own commercial interests are more likely to use platforms as their online channel. In addition, firms declaring that the reviews they receive have a significant impact on their sales will adopt platforms with a higher probability. Finally, when testing for complementarities, the results support the existence of interdependencies between platforms and search engines.

Next, we look at the more specific question of platform choice. To do so, we focused on two different but related questions: first, the decision to use a platform or not and, second, what's the intensity of use of the chosen platform. As before, firms with sales to other EU countries and those selling to consumers are more likely to operate with platforms. Surprisingly, size and age are not relevant in the decision to use a platform. When we consider the firms' perceptions about the terms and conditions offered by the platforms and about the use of data on the intensity of use of the platform, our results indicate that companies using online marketplaces that agree that the terms and conditions for online marketplaces are clear will use platforms more intensively only in a subset of results, indicating that this result is not consistent. On the other hand, companies using online marketplaces that agree that the information they receive through the online marketplace about the behaviour and preferences of their customers is useful for the development or improvement of their products or services are more likely to use platforms more intensively. This result is strong and consistent in all the different specifications.

We have discussed and showed that firms can use several platforms at the same time i.e., firms can multi-home. Sometimes, these platforms can be from different categories. Hence, we have analysed if the different categories are complementary to each other. The results indicate that the decisions to use different types of platforms are complementary strategic decisions by firms. This is quite relevant for marketplaces and app stores, on one hand, and app stores and online advertising platforms, on the other. Online advertising complements every other platform choice, and particularly the choice of an app store. Two exceptions to this general complementarity rule are the choice of app stores and social networks, which is strongly independent, and marketplaces and social networks which are minor substitutes.

Despite the efforts in providing sound evidence, this report has several limitations which call for caution in the interpretation and generalisation of the results. First, the available survey data, although useful, is not ideal to perform the adequate empirical analysis. The data from surveys collects information from firms sampled from traditional business registrars and sources, and hence may introduce some biases in the analysis, or can simply be not representative of the universe of firms operating with platforms. These datasets cover only a small number of Member States, which introduce another source of concern. In general, there may be several sample biases that could be affecting the results. Unfortunately, these are the only sources of information available. Second, the data coming from specific platforms is in general more complete, and covers many relevant variables for a more robust methodological approach. However, it can be used only as case studies or examples of specific features, but results coming from these examples cannot be generalised. These data limitations raise concerns about the robustness of the results presented here. All these limitations call for further research in the topics covered in this report.

References

- Armstrong, M., 2006, Competition in two-sided markets. *Rand Journal of Economics* 37(3): 668-691.
- Blair, R.D. and J.L. Harrison, 1993, *Monopsony – Antitrust Law and Economics*. Princeton University Press.
- Boudreau, K. and A. Hagiu, 2009, Platform Rules: Multi-Sided Platforms as Regulators. In Annabelle Gawer (ed), *Platforms, Markets and Innovation*, Cheltenham, UK and Northampton, MA, US: Edward Elgar.
- Budzinski, O. and K.H. Köhler, 2015, Is Amazon The Next Google? *ORDO* 66(1): 263–288.
- Caillaud, B. and B. Jullien, 2003, Chicken and Egg: Competition among Intermediation Service Providers. *Rand Journal of Economics*, 34(2), 309–328.
- D'Este, P., Iammarino, S., Savona, M., von Tunzelmann, N. 2012, What hampers innovation? Revealed barriers versus deterring barriers. *Research Policy*, 41(2) 482-488.
- De Luca, G., and V. Perotti. 2011. Estimation of ordered response models with sample selection. *Stata Journal* 11: 213–239.
- Edelman, B. and J. Wright, 2015, Price Coherence and Excessive Intermediation. *The Quarterly Journal of Economics* forthcoming. doi:10.1093/qje/qjv018
- Evans, D. S., 2012, Governing Bad Behaviour by Users of Multi-Sided Platforms. *Berkeley Technology Law Journal* 27(2).
- Evans, D. S., 2013, Economics of Vertical Restraints for Multi-Sided Platforms. *Competition Policy International* 9(1).
- Galeotti, A. and J.L. Moraga-González, 2009, Platform intermediation in a market for differentiated products. *European Economic Review* 53: 417-428.
- Hagiu, A. and B. Jullien, 2009, Why Do Intermediaries Divert Search? *Rand Journal of Economics*, 42: 337–362.
- Hagiu, A., 2009, Two-Sided Platforms: Product Variety and Pricing Structures. *Journal of Economics and Management Strategy* 18(4): 1011-1043.
- Hendricks, K., and McAfee, R.P., 2010, A theory of bilateral oligopoly. *Economic Inquiry*, 48: 391–414.
- Hestres, L., 2013, App Neutrality: Apple's App Store and Freedom of Expression Online. *International Journal of Communication* 7: 1265–1280.
- Inderst, R. and G. Shaffer, 2007, Retail mergers, buyer power, and product variety. *The Economic Journal* 117: 45–67.
- Inderst, R. and G. Shaffer, 2008, Buyer Power in Merger Control. In W. D. Collins (ed.), *Issues in Competition Law and Policy*, Vol. II (pp. 1611-1635). Chicago: American Bar Association.
- Inderst, R. and T. Valletti, 2011, Buyer power and the 'waterbed effect'. *The Journal of Industrial Economics* 59(1): 1-20.
- Inderst, R., 2007, Leveraging buyer power. *International Journal of Industrial Organization* 25(5): 908-924.
- Katz, M.L., 1987, The welfare effects of third degree price discrimination in intermediate goods markets. *American Economic Review* 77: 154-167.
- Messinger, P.R. and C. Narasimhan, 1997, A model of retail formats based on consumers' economizing on shopping time. *Marketing Science* 16: 1-23.

- Nash, J.F., 1950, The bargaining problem. *Econometrica* 28: 155-162.
- Noll, R.G., 2005, "Buyer Power" and Economic Policy. *Antitrust Law Journal* 72: 589-624.
- Nordemann, J., 1995, Buying power and sophisticated buyers in merger control law: The need for a more sophisticated approach. *European Competition Law Review* 5: 270-281.
- Osborne, M.J. and A. Rubinstein, 1990, *Bargaining and markets*. Academic Press.
- Parker, G. and M. W. Van Alstyne, 2005, Two-sided network effects: A theory of information product design. *Management Science*, 51(10), 1494-1504.
- Parker, G. and M. W. Van Alstyne, 2008, *Innovation, Openness and Platform Control*, working paper, Tulane University, Boston University and MIT.
- Piskorski, M.J., H. Halaburda and T. Smith, 2008, eHarmony. Harvard Business School case study n. 709-424.
- Rochet, J.C. and J. Tirole, 2003, Platform Competition in Two-Sided Markets. *Journal of the European Economic Association*, 1(4), 990-1029.
- Rochet, J.C. and J. Tirole, 2006, Two-Sided Markets: a progress report. *Rand Journal of Economics*, 37(3), 645-667.
- Sayman, S., S.J. Hoch, and J.S. Raju, 2002, Positioning of store brands. *Marketing Science* 21: 378-97.
- Scherer, F.M. and D. Ross, 1990, *Industrial market structure and economic performance*. Boston: Houghton Mifflin.
- Scott-Morton, F., and F. Zettelmeyer, 2004, The strategic positioning of store brands in retailer-manufacturer bargaining. *Review of Industrial Organization* 24(2): 161-194.
- Sheffman, D.T. and P.T. Spiller, 1992, Buyers' strategies, entry barriers, and competition. *Economic Inquiry* 30: 418-436.
- Smith H. and J. Thanassoulis, 2006, Upstream competition and downstream buyer power, mimeo.
- Spulber, D., 1999, *Market Microstructures: Intermediaries and the Theory of the Firm*. Cambridge University Press, New York.
- Steptoe, M., 1993, The power-buyer defense in merger cases. *Antitrust Law Journal* 61: 493-505.
- Tremblay, M.J., 2016, Vertical Relationships within Platform Marketplaces. *Games* 7(3): 17.

List of tables

Table 1. Strategic channel choice.15

Table 2. Strategic channel choice: search engines.16

Table 3. Strategic channel choice: rating systems.....17

Table 4. Channel complementarity.....17

Table 5. The decision to join a platform and the intensity of use, terms and conditions.19

Table 6. The decision to join a platform and the intensity of use, data.....21

Table 7. UTPs and platform usage.22

Table 8. Revealed vs. deterring UTPs.23

Table 9a. Single- vs. multi-homing, overall results.24

Table 9b. Single- vs. multi-homing, by category.25

Table 10. Relationship between multi-homing and problems with platforms.26

Table 11. Relationship between the intensity of competition and multi-homing.26

Table 12. Choice of platform category.27

Table 13. Platform complementarity.28

Table 14. Market penetration.28

Table 15. Two-segment Latent Class results.29

Annexes

Annex 1.

The online channel decision, which is not exclusive since some firms can use several channels, can be analysed using the following specification:

$$D_{it} = \begin{cases} 1 & \text{if } \beta X + \varepsilon_{it} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

In equation (1), D corresponds to the dichotomous decision to use or not one of the available online channels: own website, platform and/or search engine. Since the choice set includes three possible decisions, to carry out the estimations we use a trivariate probit model. For three binary variables D_1 , D_2 , and D_3 , the trivariate probit model supposes that:

$$D_1 = \begin{cases} 1 & \text{if } \beta X + \varepsilon_1 > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$D_2 = \begin{cases} 1 & \text{if } \beta X + \varepsilon_2 > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$D_3 = \begin{cases} 1 & \text{if } \beta X + \varepsilon_3 > 0 \\ 0 & \text{otherwise} \end{cases}$$

With $\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} \rightarrow N(0, \Sigma)$. In this case, the evaluation of the likelihood function requires the computation of trivariate normal integrals. By way of example, consider the probability of observing $(D_1 = 0, D_2 = 0, D_3 = 0)$:

$$\Pr[D_1 = 0, D_2 = 0, D_3 = 0] = \int_{-\infty}^{A_1} \int_{-\infty}^{A_2} \int_{-\infty}^{A_3} \phi_3(\varepsilon_1, \varepsilon_2, \varepsilon_3, \rho_{12}\rho_{13}\rho_{23}) d\varepsilon_3 d\varepsilon_2 d\varepsilon_1$$

where $A_i = \alpha_0 + \beta X$, ϕ_3 is the trivariate normal p.d.f., and ρ_{ij} is the correlation coefficient between i and j . We rely on the triprobit command in Stata to perform the estimations, an estimation procedure that uses the GHK (Geweke-Hajivassiliou-Keane) smooth recursive simulator to approximate these integrals and estimate the coefficients by means of simulated maximum likelihood.

We can add dichotomous variables and use the same methodology for the analysis of choices with more than three options, as we do in section xx.xx.

Annex 2.

The ordered probit estimation with sample selection estimates the parameters of a regression model for an ordered categorical outcome from a non-random sample known as a selected sample. Selected samples suffer from "selection on unobservables" because the errors that determine whether a case is missing are correlated with the errors that determine the outcome.

Even though we are interested in modelling a single ordinal outcome, there are two dependent variables in the ordered probit sample-selection model because we must also model the sample selection process. First, there is the ordinal outcome y_j . Second, there is a binary variable that indicates whether each case in the sample is observed or unobserved. To handle the sample-selection problem, we model both dependent variables jointly. Both variables are categorical. Their categorical values are determined by the values of linear combinations of covariates and normally distributed error terms relative to certain cutpoints that partition the real line. The error terms used in the determination of selection and the ordinal outcome value may be correlated.

The probability that the ordinal outcome y_j is equal to the value v_h is given by the probability that $\mathbf{x}_j\beta + u_{1j}$ falls within the cutpoints κ_{h-1} and κ_h ,

$$\Pr(y_j = v_h) = \Pr(\kappa_{h-1} < \mathbf{x}_j\beta + u_{1j} \leq \kappa_h)$$

where \mathbf{x}_j is the outcome covariates, β is the coefficients, and u_{1j} is a random-error term. The observed outcome values $v_1 \dots v_H$ are integers such that $v_i < v_m$ for $i < m$. κ_0 is taken as $-\infty$ and κ_H is taken as $+\infty$.

We model the selection process for the outcome by $s_j = \mathbf{1}(\mathbf{z}_j\gamma + u_{2j} > 0)$

where $s_j = 1$ if we observed y_j and 0 otherwise, \mathbf{z}_j is the covariates used to model the selection process, γ is the coefficients for the selection process, $\mathbf{1}(\cdot)$ denotes the indicator function, and u_{2j} is a random-error term.

(u_{1j}, u_{2j}) have bivariate normal distribution with mean zero and variance matrix

$$\begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}$$

When $\rho \neq 0$, standard ordered probit techniques applied to the outcome equation yield inconsistent results. The ordered probit with sample selection estimation would provide consistent, asymptotically efficient estimates for all the parameters in such models. See De Luca and Perotti (2011) for a detailed explanation of the maximum likelihood estimator used in this type of models.

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: <http://europa.eu/contact>

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696, or
- by electronic mail via: <http://europa.eu/contact>

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: <http://europa.eu>

EU publications

You can download or order free and priced EU publications from EU Bookshop at: <http://bookshop.europa.eu>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see <http://europa.eu/contact>).

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub

ec.europa.eu/jrc



@EU_ScienceHub



EU Science Hub - Joint Research Centre



Joint Research Centre



EU Science Hub