

## Should We Regulate Digital Platforms? A New Framework for Evaluating Policy Options

Pieter Nooren, Nicolai van Gorp, Nico van Eijk, and Ronan Ó Fathaigh 

---

*The economic and societal impact of digital platforms raises a number of questions for policymakers, including whether existing regulatory approaches and instruments are sufficient to promote and safeguard public interests. This article develops a practical framework that provides structure and guidance to policymakers who design policies for the digital economy. The framework differs from other approaches in taking the digital business models of platforms as the starting point for the analysis. The framework consists of three pillars, namely determining a platform's characteristics, relating these to public interests, and formulating policy options. The framework then invokes a return-path analysis for assessing how the interventions affect the business model, whether it has the desired effect on public interests, and ensuring it has no undesired side-effects on public interests. The framework puts forward two key messages for current discussions on digital platforms. First, one should look at the underlying characteristics of platforms rather than trying to understand digital platforms as a single category. Second, policymakers should explore existing rules and policy options, as they seem fit to deal with several characteristics of digital platforms in a time frame that matches the rapid development of platform technologies and business models.*

---

**KEY WORDS:** digital platforms, business model analysis, public interests, competition policy, consumer protection, platform regulation

数字平台的经济影响和社会影响为政策制定者提出了一系列问题，包括：现行监管措施和监管工具是否足以推动并保护公共利益。本文提出一项操作框架，它能为涉及数字经济政策的政策制定者提供架构和指导。此框架和其他措施的不同之处在于，它将数字商业平台模式作为分析的起点。该框架由三部分组成，即平台特性的确定、公共利益和平台特性的相关性、以及政策选择的制定。该框架之后提出一项“返回路径分析”（return-path analysis），用于评估各项干预如何影响商业模式，它是否对公共利益产生了预期效果，并确保没有造成不需要的副作用。该框架为当前有关数字平台的探讨提出了两条关键信息。第一，（我们）应该考虑平台潜在的特征，而不是试图将平台作为单一类别进行理解。第二，政策制定者应该探索现有规则和政策选择，因为这些规则和选择似乎能在一个时间框架内处理数字平台的好几个特征，这个时间框架能适应急速发展的平台技术和商业模式。

---

**关键词：** 数字平台，商业模式分析，公共利益，竞争政策，消费者保护，平台监管

*El impacto económico y social de las plataformas digitales resulta en varias preguntas para los creadores de políticas, incluyendo si los acercamientos regulatorios y los instrumentos existentes son suficientes para promover y salvaguardar los intereses públicos. Este artículo desarrolla un marco para las prácticas que proporciona una estructura y orientación para los creadores de políticas que diseñan políticas para la economía digital. El marco teórico difiere de otros acercamientos, ya que toma los modelos de negocios de las plataformas como un comienzo para el análisis. El marco teórico consiste en tres pilares, es decir: determinar las características de una plataforma, en relación con estos intereses públicos y formular las opciones políticas. El marco teórico después recurre a un análisis de trayectoria de retorno para evaluar cómo las intervenciones afectan al modelo de negocios, si tiene el efecto deseado en los intereses públicos y asegurando que no tenga efectos no deseados para los intereses públicos. El marco teórico presenta dos mensajes clave para las discusiones actuales acerca de las plataformas digitales. Primero, uno debería examinar las características subyacentes de las plataformas en vez de intentar entender las plataformas digitales como una sola categoría. Segundo, los creadores de políticas deberían explorar reglas existentes de opciones políticas, ya que parecen poder lidiar con varias características de las plataformas digitales en una secuencia de tiempo que concuerda con el desarrollo rápido de las tecnologías de plataforma y de los modelos de negocios.*

---

**PALABRAS CLAVES:** plataformas digitales, análisis de modelos de negocios, intereses públicos, política de competencia, protección al consumidor, regulación de plataformas

## Introduction

The Internet is driving the development of the so-called platform economy (Kenney & Zysman, 2016), and indeed the platform society (Nash, Bright, Margetts, & Lehdonvirta, 2017). Digital platforms provide a basis for delivering or aggregating services and content from service and content providers to end users. These basic operating principles are found in platforms in a variety of sectors and they are also reflected in other definitions of digital (or online) platforms, such as that proposed earlier by the European Commission (2015c). In what we can now consider as the early days of digital platforms, they tended to restrict themselves to sectors with natural ties to the Internet (e.g., Google search), communication (Skype, WhatsApp), media (YouTube, Vimeo), and e-commerce (Amazon, Zalando). The link between platforms and the physical world that first appeared in e-commerce has grown much stronger as the Internet and platforms have progressed into many other sectors such as mobility (Uber), food delivery (Deliveroo, Foodora), hotels and accommodation (booking.com, Airbnb), and home automation (Google Nest, Apple). In parallel to the activities of the well-known large platforms that operate at a global scale, there are many national and local platforms, ranging from national e-commerce activities to not-for-profit sharing economy initiatives. Some of the larger platforms seem to have developed into conglomerates of interconnected platforms, several of which have become dominant market players in a relatively short period of time.

Digital platforms put pressure on existing government policies for stimulating innovation and economic development and for safeguarding public interests. Platform owners present themselves as bridge builders or gatekeepers,

intermediating between parties on different sides of the platform. Their platforms offer new and attractively priced services to consumers, but at the same time they affect the possibility for new players to enter the market and change the ways consumers interact with services and service providers. For these reasons, digital platforms currently are of particular interest to policymakers. They wish to understand the positive and negative impacts that these platforms may have on public interests in order to be able to determine if, how, and when to intervene. Examples of the policy questions on the table include what opportunities these platforms present for innovation, how they can promote the transparency of markets, how they may impact freedom of choice for consumers, how they affect freedom of speech, how they treat the personal data of users, and what are the labor implications. The European Commission has explored such questions and their background in its September 2015 consultation (European Commission, 2015c) on the regulatory environment for platforms. The responses fed into its approach to online platforms announced in May 2016 (European Commission, 2016c), which describes the principles that the Commission will take into account in its elaborations on platforms. Together with a number of further steps envisaged by the Commission, this in effect provides a roadmap for further policy development and indicates that these types of questions will be on the table in the years to come. In parallel with the Commission's work, studies on the economic and social effects of platforms have been carried out at the national level (Autorité de la Concurrence and Bundeskartellamt, 2016; Bundeskartellamt, 2016; French Digital Council, 2014; House of Lords, 2016; Monopolkommission, 2015).

The framework presented in this article aims to provide structure and guidance to policymakers who design policies for the digital economy, and digital platforms in particular. The remainder of the article is structured as follows. The first section describes the framework itself. It shows how well-known concepts from economic literature (such as network effects and economies of scale) prove to be very relevant as platform characteristics, and that they can be used as the starting point for analyzing the effects of platforms on public interests, such as competition and innovation. This is illustrated by the case studies we used in the development of the framework: Apple, Facebook, Netflix, Thuisafgehaald,<sup>1</sup> and Bol.com.<sup>2</sup> For policymakers and regulators, the positive and negative effects that platforms can have on public interests form the basis for their considerations on policy instruments and their application. The following section outlines how the framework is applied in practice, emphasizing the need to use a return-path analysis to ensure that instruments chosen to promote or safeguard a particular interest do not have undesired and unacceptable effects on other public interests. The final section summarizes how the framework promotes completeness and consistency in policy development and emphasizes the two key messages for policymakers that emerged during its development: (i) consider the underlying characteristics of platforms and business models rather than trying to deal with digital platforms as single category and (ii) explore existing instruments and options that can be applied to digital platforms before considering new rules.

## No Consensus on the Definition of Digital Platforms

The term “digital platform” is often loosely defined. Many studies on digital platforms do not provide a definition or the authors use examples to make clear what they refer to when they mention digital platforms. In the Digital Single Market Strategy, the European Commission mainly describes some characteristics of digital platforms and mentions a number of examples of platforms (e.g., search engines, social media, e-commerce platforms, app stores, and price comparison websites; European Commission, 2015b). In a previous study for the Dutch Ministry of Economic Affairs on the role of the government in the Internet, Analyses Mason defined a platform as “a service whose role it is to allow end users to access other providers located upstream in the value chain” (Allen & Flores, 2013, p. 11). In a study for the European Parliament by Ecorys, a broader definition was presented, which is also used in this article: “A digital platform provides a (technological) basis for delivering or aggregating services/content from service/content providers to end-users” (Van Gorp & Batura, 2015, p. 7).

It is useful to use a broad definition, in view of the wide variety of digital platforms that cannot be easily compared. In our view, it is necessary to analyze the specifics of each platform, as platforms compete via the characteristics of the platform. Contrary to the definition used by the European Commission in its consultation on platforms, this article does not limit the definition to two (or multi)-sided markets (European Commission, 2015c). In a multi-sided market, there are distinct user groups, and if the number of users on one side of the platform increases, that is beneficial to users on the other side of the platform. The reason is that there are firms with a technical basis for delivering content to end users that are not multi-sided but that can nevertheless be considered to be digital platforms, for example, Netflix. Moreover, firms can make the strategic decision to move from a one-sided to a multi-sided platform and vice versa.

The article does not concern all platforms, but only *digital* platforms. A digital platform uses the Internet for communication between users on all the sides of the platform. There are other platforms which are not digital, for example, newspapers. Owners of digital platforms can offer a variety of services. In this article, when reference is made to a platform of a firm, all the services of the firm are considered (i.e., no distinction is made between Apple Pay and the Apple App Store). The reason is that there is probably a business rationale to combine the services. Therefore, the business model of the integrated firm should be considered in the analysis of public interests and policy interventions.

## An Analytical Framework for Digital Platforms

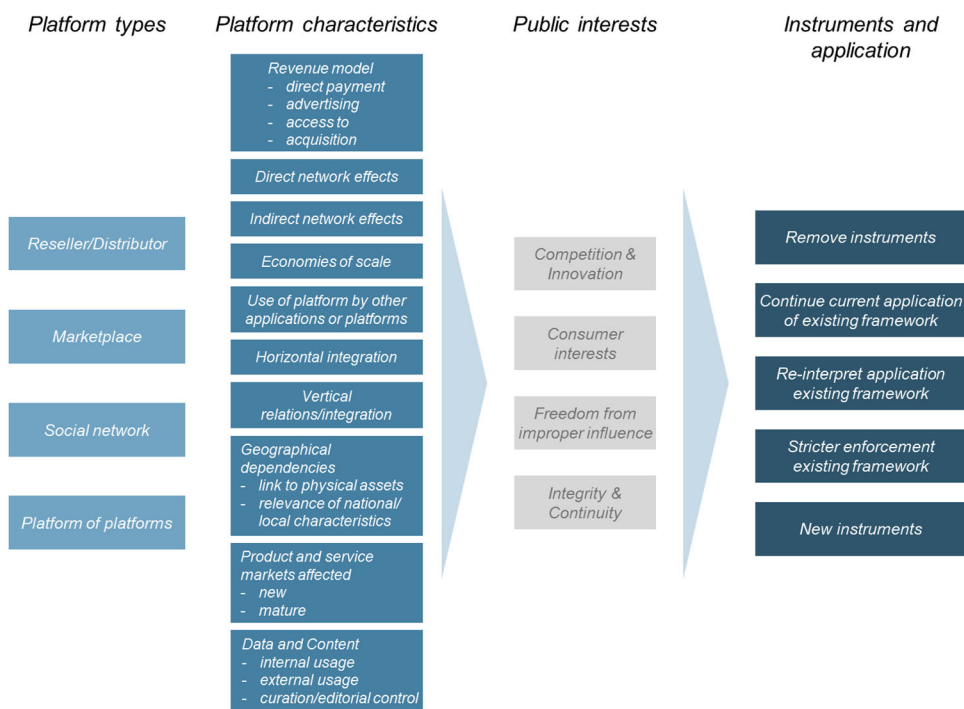
### *Platform Characteristics*

The starting point of the framework is provided by the business models based on digital platforms. Rather than trying to come up with a generic definition of platforms, the focus is instead on how business models use and

operationalize platform economics. Our approach is motivated by the heterogeneity of platforms and business models that we observe. Developers of digital business models make different strategic choices in how they internalize demand externalities (i.e., exploit direct and indirect network effects). This choice is made simultaneously with other strategic choices related to the business model: what revenue model to adopt (direct payment, advertising, revenue share)? How to use data (internally, externally, curation/editorial control)? How to manage vertical dependencies throughout the value chain (platform of platforms, vertical integration)? Are there economies of scale and scope to be exploited? Indeed, companies may have multiple platforms, and may choose to create synergies by linking platforms through user data. A generic definition of platforms does not contribute to the understanding of the impact of these choices on public interests such as competition and innovation, and end user protection. On the contrary, a quest for an all-encompassing definition carries the danger that the discussion and analysis is restricted to the definition itself and does not address the public interests involved.

In the following sections, we introduce the key platform characteristics that we have identified. In the graphical representation of the framework (see Figure 1), the characteristics can be found in the second column.

The first characteristic is the revenue model. Peitz and Valletti (2015) identify three types of digital (platform-based) business or revenue models for online



**Figure 1.** Overview of the Framework.

service providers (note that platforms can also use a mix of these revenue models). These revenue models are as follows:

1. Direct payment. The platform charges users for its service or product. Well-known examples are Netflix (which sells subscriptions to its video service) and e-commerce platforms such as Amazon Marketplace (where Amazon charges a transaction fee for products traded on the platform).<sup>3</sup> This may also include a freemium model, where users are not charged for a basic service, but they must pay a fee to access advanced features (e.g., Spotify; Elvy, 2017). Apple and Microsoft also have a direct payment model for the hardware and software they sell.
2. Advertisement model. Platforms provide a service, and consumers indirectly provide revenues by being exposed to advertising. Moreover, by using personal data, the platform can improve the effectiveness of the advertising.
3. Access model: Platforms based on the access model connect app and content developers to users (e.g., Apple's App Store). Here, the platform may charge those app and content developers for selling their product or service to users. Similarly, the platform provider may charge users on behalf of the app and content developers. Thus, the platform mediates between suppliers and consumers.

We note that the advertisement model could also be regarded as a form of paying for access. There is, however, a difference between app and content developers and advertisers, in that app and content developers may attract other users, whereas advertisers generally do not attract other users. In other words, advertisers may be charged to the full extent without having a negative impact on the growth of the other user groups, while charging a too-high price of app and content developers may go at the expense of the growth of other user groups.

Some newly founded platforms seem not to generate revenue at all. Their primary purpose is to experiment with a business model or a technology, try to build a mass of users, while postponing the goal of financial viability. The latter is realized at a later stage when the company has realized sufficient scale and has figured out which of the above-mentioned revenue models is most profitable, or when it is purchased by another company offering complementary services (e.g., as in the acquisition of WhatsApp by Facebook or LinkedIn by Microsoft). Because these kinds of acquisitions are common for digital platforms, a fourth revenue model is added to the typology of business models:

4. Acquisition or growth model. Platforms aiming to create future value by developing platform technology and by amassing users on the platform without a business model that generates a sustainable revenue stream. Despite the lack of current revenues, the role of these types of platforms should not be underestimated as they can grow rapidly and become future challengers of other platforms.

Note the acquisition model is a revenue model for the owners of a platform, but not necessarily for the platform itself. Following the acquisition of a platform, its new owners will, in the absence of complementarity services, have to work out which type of revenue model (1, 2, or 3, above) best fits the platform. When there are complementarities (such as WhatsApp providing Facebook with additional personal data, or Maps allowing Google users to perform location-related searches), the new platform owner may simply integrate the acquired service in its current revenue model.

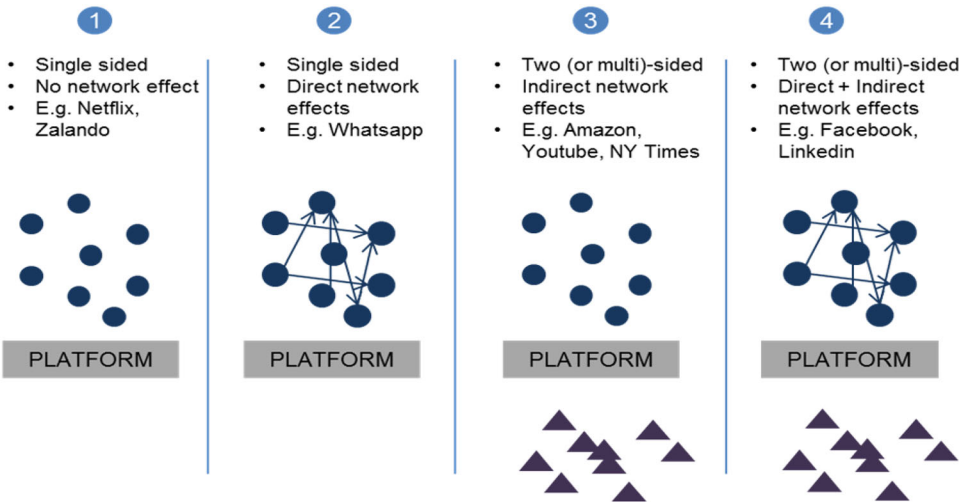
A characteristic shared by many digital platforms is that they internalize demand externalities within or between different user groups (Batura, van Gorp, & Larouche, 2015; Evans & Schmalensee, 2007). Demand externalities *within* user groups result in a *direct network effect*, meaning that a platform becomes more attractive for users as the total number of users on the same side of that platform grows. Direct network effects are typical for social networks and communication applications like Facebook, LinkedIn, WhatsApp, and Skype. By contrast, demand externalities *between* user groups result in an *indirect network effect*, meaning that a platform becomes more attractive for one group of users (e.g., advertisers) as another group of platform users (e.g., consumers) grows. Indirect network effects are typical for platforms that facilitate transactions (like Amazon Marketplace and Booking.com) and platforms with an advertisement-based revenue model (like YouTube). Platform owners can also choose to exploit both types of network effects (e.g., Facebook) or none at all (e.g., Netflix).<sup>4</sup>

Several articles from the 1970s and 1980s have already explained that network effects may result in winner-take-all market outcomes (Farrell & Saloner, 1985; Katz & Shapiro, 1985; Rohlfs, 1974). During the 2000s, following the seminal work by Rochet and Tirole (2003, 2006),<sup>5</sup> the term *platform* has practically become another word for multi-sided markets which are characterized by indirect network effects. For example, Martens (2016, p. 10) states that “In its most generic form a ‘platform’ is a market place where two or more distinct types of users (for instance, buyers and sellers) can meet to exchange goods, services information, etc.” It follows that platforms without network effects would not be considered as platforms. However, from a technological point of view, any technological basis for delivering (multiple) goods and services to end users can be a platform, whether or not its operator chooses to internalize demand externalities.<sup>6</sup> Following Evans and Gawer (2016), one may define such platforms as “innovation platforms” to distinguish them from “transaction platforms” (as in a market place on which people exchange goods and services). An innovation platform is typically characterized by economies of scope, whereas a transaction platform is (also) characterized by indirect network effects. Both effects can be highly complementary such that the combination of a technological platform with a transaction platform is very powerful and may result in a platform of platforms (as pointed out by Evans and Gawer [2016] referring to the examples of Apple iOS and App Store, and Android and Google Play). These definitions do not yet contain all the essential characteristics of digital business models that are observed in the digital economy. In particular, “communication platforms” such as WhatsApp, which

are typically characterized by direct network effects, are not covered by these definitions. Finally, we point out that in management books, such as Rogers (2016), Choudary (2015), and Parker, Van Alstyne, and Choudary (2016), the difference between platform-based business models and traditional business models is explained in that a traditional firm creates value by processing inputs into outputs, whereas a platform facilitates the creation of value by its users; this is of course analogous to the concept of network effects.

From the above, it follows that there are four basic models for operating a digital platform: (i) one-sided without network effects; (ii) one-sided with direct network effects; (iii) two-sided with indirect network effects; and (iv) two-sided with indirect and direct network effects (see Figure 2).

Business models may change over time, and so does the way in which a platform is operated. Netflix is currently acting as a reseller of content and is running a business model of type 1, but it may allow its users to interact (become a type 2) or open its platform for advertisers (type 3). For example, Netflix could exploit strong indirect network effects if it decided to open up its platform for advertisers.<sup>7</sup> Hagiu and Wright (2015a, 2015b) point out that it is a strategic choice for firms to position themselves toward, or further away from, a multi-sided platform. They mention as an example Amazon, which started as a pure retailer but has moved closer to a multi-sided model over time by enabling third-party sellers to trade directly with consumers on its website. In most cases, it is strategically unwise to start a business immediately as a multi-sided platform as it involves a chicken-and-egg problem: which side to attract first?<sup>8</sup> This may also explain why Zappos, an online shoe retailer, went in the other direction, abandoning its initial model based on partnerships with shoe manufacturers that fulfilled customer orders directly. Further, Amazon has a number of aspects to its



**Figure 2.** Basic Business Models for Platforms Based on Direct and Indirect Network Effects (Illustration Courtesy of Ecorys Nederland).

business, including as a retailer, platform (Marketplace, Appstore), and device manufacturer (Kindle, Echo); while also being a retailer on its own platform. Amazon may, therefore, have some internal conflicting interests, in terms of Amazon as a retailer versus Amazon as the platform operator. Assuming Amazon has a long-term focus, logically the interests of Amazon as a platform should outweigh the interest of Amazon as a retailer, given that the platform is characterized by network effects and the retailer is not.

Economies of scale mean that the average cost declines as the number of users increases. For example, when a platform has a very large and growing user base, it is likely able to negotiate lower input prices (e.g., license fees). Economies of scale are not unique to digital platforms given that in many industries the cost per unit diminishes when output increases, but the effect is more pronounced for digital platforms as the marginal costs are often close to zero. We note that the difference between network effects and buying power is not always clear. Network effects arise due to demand externalities, and scale economies result from the cost structure. However, when a large user base (resulting from network effects) leads to better buying conditions, this affects the cost structure. Both economies of scale and network effects can result in a market with a few dominant players.

Economies of scope imply that the average cost declines as more different goods and services are offered. Scope economies are very important in business models that run on the mining and processing of (big) data. The ability to compete increases when a company has multiple platforms in different areas and creates synergies by linking platforms through user data. By combining user data from multiple platforms, a multi-platform operator can optimize the experience for both end users and advertisers across all platforms. At the same time, each platform can be regarded as an additional vein in the company's data mine. As such, the operation of multiple interlinked platforms creates multiplier effects. Because of this multiplier effect, there is a risk that digital platform operators can make themselves indispensable for both end users as well as advertiser/retailers, and place themselves in a gatekeeper position (Prüfer & Schottmüller, 2016; Van Gorp & Batura, 2015; Van Til, Van Gorp, & Price, 2017).

Considerable effort may be involved in integrating an acquired service with an existing suite of services. An overlapping user base facilitates integration and hence the opportunity for scope economies. Overlapping user bases are likely for operators of platforms on which apps or platforms from others are thriving (Van Eijk et al., 2015). Such a "platform of platforms" may potentially act as a gatekeeper when it controls vital assets for the functioning of other platforms. These assets can consist of an operating system (including application stores) or a user base. Well known examples of platforms of platforms are the operating systems of Google (Android, combined with Google Play), Apple (iOS, combined with the App Store), and Microsoft (Windows, recently combined with the Windows Store).

As explained above, horizontal mergers and acquisitions may be motivated by data-driven scope economies. However, as in regular industries,

mergers and acquisitions may also be motivated by demand-side substitutability and complementarity. The argument goes that as digital market boundaries are in constant flux due to the dynamics of digital business models, substitutability or complementarity of services should not be assessed in terms of “today” but rather in a forward-looking perspective. As such, a horizontal merger may be pre-emptive in nature, even if the services seem unrelated today, and even when the acquired company’s market share is still relatively small.

Vertical integration is often employed to internalize transaction costs or externalities (Van Gorp, van Doorn, & Canoy, 2008). In the digital economy, transaction costs are very low so that assets from others (e.g., data centers) can more easily be combined with own assets without integration. However, vertical integration may also be motivated by having control over a larger part of the value chain. Platforms that make the strategic decision to control a larger part of the value chain combine their digital platform with physical assets such as a distribution network, data servers, the manufacturing of computers and smart phones, etc.

For digital platforms, it is generally relatively easy to act globally due to economies of scale and network effects, but some platforms choose to act in one or a limited number of geographic markets (Van Eijk et al., 2015). For platforms that act as a market place, it is often important that users who offer services or goods on the platforms are in close proximity to users that want to use the services or goods. Cultural differences can be a reason to differentiate the characteristics of a platform between countries or regions.

Some digital platforms have created new markets that did not exist before, for example, the “market for social networking.” Such digital platforms do not compete directly with traditional industries as they establish new (digital) markets. On the other hand, many platforms that mediate between users often do have an impact on traditional industries. For example, this is the case for e-commerce platforms and platforms that are active in the sharing (or collaborative) economy. In this category, one can distinguish regulated product and services markets and unregulated markets. In developed economies, all markets are regulated to a certain extent. However, in some markets government intervention is higher than in other markets.

The generation and analysis of data is a key element in most digital business models. Data are mined from the user base and can be used to improve services by offering a better user experience. It can also be used to create new services and it can be sold. A platform can thus be seen as a “data mine” from which the digital company is excavating data for internal or external use. Internal usage refers to using the data for optimizing the experience of platform usage (on either side of the platform) and external usage refers to using the data to provide services to third parties (Van Eijk et al., 2015). Most platforms use the data internally as it enhances networks effects: more users generate more data, which can be used to improve user experience, which attracts more users; because the platform has more users and more data, it can deliver better advertisement

campaigns and thereby attract more revenues, which in turn can be used to improve user experience, which attracts more users, etc. (De Streel, 2016; Prüfer & Schottmüller, 2016). This chain of causal effects assumes that the algorithm used for processing the data is of a given quality level. However, a company with less data (i.e., fewer users) but a better algorithm could in principle defeat a company with more data (i.e., more users). The competitive position of a digital platform is thus a function of its data set (size and dimensions) and its algorithm (Van Til et al., 2017). With respect to the latter, however, there is an asymmetry between platform operators and users about the quality of the algorithms (Knapp, 2016). The knowledge asymmetry about quality hinders competition between algorithms. It follows that, in theory, competition between digital firms is biased toward building large multidimensional data sets rather than improving the quality of algorithms.

Platforms on which content is generated by users can choose not to touch any of the content or to screen/edit (“curate”) data to bring it into line with the specific policies of the platform. Curation of data is a relevant consideration for platforms that act as a platform for other platforms as they can, for instance, set conditions for access to an application store. Curation of data is also relevant for a social network such as Facebook, which has policies determining what content is allowed on the platform.

### *A Coarse Typology of Digital Platforms*

It is difficult to capture the heterogeneity of different digital business models in a single definition of “digital platforms.” However, it is helpful for the analysis of a particular digital business model to start from a coarse typology of platforms based on the services that are offered. We identify four categories which may serve as an initial guide for a more detailed analysis. The categories differ in terms of whether there are transactions between users of the platform, whether there is communication between users of the platform, and whether the platform is used by other platforms to reach end users. Depending on the particular revenue model that is applied, these differences determine to a large extent whether or not network effects can be operationalized. This leads to a coarse typology with four categories (see Figure 3):

1. *Resellers or distributors* provide content or products to end users. There is no transaction between consumers and the (upstream) suppliers of products, hence there are no indirect network effects. Netflix is an example in this reseller category.
2. *Market places* facilitate transactions between user groups on the platform. The transactions can include many products and services, and marketplaces can, therefore, have an impact on a wide array of markets. There are indirect network effects between suppliers and consumers. An example is the Dutch e-commerce platform Bol.com, which offers retailers the opportunity to use its infrastructure to reach consumers.

	Reseller distributor	/ Marketplaces (peer-to-peer)	Social networks	Platforms of platforms
Transactions	No	Yes	No	Possible
Communications	No	No	Yes	No
Network effects	No	Indirect network effects	Direct network effects*	(Multiple) direct and indirect network effects

\* In case an advertisement based revenue model is applied, there may be indirect network effects between different users and advertisers

Case in this study:



**Figure 3.** A Rough Typology of Platforms Based on the Services Offered, With an Indication of the Position of the Five Cases Considered in This Study.

3. *Social networks* enable social interaction between users that generate and share content, hence there are direct network effects. Depending on the revenue model, there may also be indirect network effects. Prime examples here are Facebook, WhatsApp, and Twitter.
4. *Platforms of platforms* are platforms or ecosystems on which other platforms work, which Andersson Schwarz (2017) has described as panoplies of interconnected platforms. As an example, Apple's iOS mobile operating system clearly has the characteristics of an ecosystem as it provides a platform to access other digital platforms (e.g., Google Maps). Facebook also has some of these characteristics. For example, it offers the opportunity to application developers to build applications specifically for the users of the social network and lets other websites and services make use of its login system.

Note that some business models combine elements of two or more of the service types—for example, part of Amazon's business model entails reselling and distributing of items, but Amazon also facilitates transactions between other retailers and consumers (Amazon Marketplace). This illustrates that this coarse typology provides only limited guidance and cannot replace a more detailed analysis of the characteristics of individual platforms. In a recent staff working document on Online Platforms, the European Commission (2016b) outlines five categories, partly overlapping with the four introduced here,<sup>9</sup> and recognizes that different approaches are found within each category.

### *Public Interests*

Public interests refer to the interest of a country or community as a whole, and their presence in a platform case can, therefore, be a justification for the intervention of governments in markets. Public interests, therefore, play a key role in the framework, reflected by the central position for the public interests in

the graphical representation of the framework in Figure 1. The public interests included in the framework are summarized in Table 1. The starting point for this set of public interests is an earlier analysis by the Dutch Ministry of Economic Affairs (Van Eijk et al., 2015), which has been slightly fine-tuned to better match the issues related to digital platforms. The four categories reflect the interests of the key stakeholders (market players, consumers, and government) and include integrity and continuity as overarching aspects.

Public interest theory offers an economic perspective to analyze whether there is a need for government intervention (Posner, 1974). In public interest theory, market failure is the primary justification for such an intervention. A classic example of a market failure is the existence of external effects. External effects are costs or benefits that a private actor such as a consumer does not take into account, but which nevertheless have an effect on others or society as a whole. Other examples of market failure are market power, asymmetric information, and economies of scale. If a market failure is identified, the costs (including possible failure of the policies) and benefits of government interventions have to be weighed against the costs (and benefits of doing nothing). Another framework on which the notion of public interests is, or can be, based is the broader normative framework of fundamental rights and freedoms, which is based on ethical and legal norms. There may also be paternalistic reasons to intervene in markets. It is important to recognize at the outset that digital platforms may have both positive and negative effects on these public interests, such as increasing competition in markets, bringing innovation, increasing consumer choice, and providing new methods for exercising fundamental rights.

It is broadly accepted that competition in markets encourages efficiency, enhances innovation, and benefits consumers. However, market players may engage in practices which negatively affect competition, such as abusing a dominant position, entering into anticompetitive agreements, or carrying out certain mergers or acquisitions. Therefore, governments may have to intervene to prevent such practices with the aim of ensuring sufficient competition and promoting innovation.

Measures to protect specific consumer interests may have a positive side effect on competition in markets. We see at least three relevant aspects. First,

**Table 1.** Public Interests and Their Interpretation in the Framework

Public Interest	Interpretation
Sufficient competition and innovation	Ensuring increase of welfare and efficiency through competition and innovation
Safeguarding consumer interests	Promoting consumer choice, offering sufficient levels of consumer protection and safeguarding fundamental rights
Freedom from improper influence	Avoiding unnecessary restrictions by governments, while safeguarding societal interests through positive obligations
Providing integrity and continuity	Market players, consumers and government need to be able to rely on safe and reliable digital communications provided by networks and services

consumers should have a freedom of choice in goods and services, which includes switching (at reasonable costs) to other suppliers. Second, there is a public interest in protecting certain consumer rights, such as preventing unfair contract terms, and having rules on advertising, sales, and guarantees. Moreover, consumers need to be sufficiently empowered to exercise these rights, including having adequate information on the exercise of these rights. Third, there is a public interest in protecting specific fundamental rights, such as a consumer's freedom of expression, right to privacy and right to data protection. Certain activities of digital platforms may have a direct or indirect effect on the exercise of these rights.

Where it comes to freedom from improper influence, the role of the government is twofold. Based on how this role is generally seen, and has been framed in jurisprudence and policy, government must on the one hand refrain from exercising improper influence. On the other hand, government has a number of justifications (or even obligations) for interfering with digital platforms' and consumers' rights, including to protect national security, public order, health, labor interests, antidiscrimination, morals, and the rights of others (such as reputation, intellectual property, privacy, and personal data). Notably, there is a growing literature in particular on the labor implications of platforms, including on the labor law and policy issues of the so-called "gig-economy" (Aloisi, 2016; Casilli, 2017a, 2017b; Prassl & Risak, 2016; Rosenblat, Levy, Barocas, & Hwang, 2017). Governments need to carefully assess their positive role and obligations, for example, relating to promoting diversity and protection of minors.

The functioning of digital platforms and the trust consumers have in them depends to a high extent on the integrity of the services and networks. The same can be said of the continuity in the provision of services and the underlying infrastructure. Technical standards on safe transactions (certificates, encryption) are a way to secure integrity. As digital platforms are highly dependent on cloud infrastructure and telecommunications networks and services, continuity—the uninterrupted availability of the infrastructure—is highly relevant. However, this infrastructure is complicated and involves a multitude of players, depending on which element of the value chain is examined (Nooren, Koers, Bangma, Berkers, and Boertjes, 2014).

### *The Relation Between Platform Characteristics and Public Interests*

The framework makes a connection between characteristics of platforms and public interests. It is not always possible to directly establish the impact of a specific characteristic on a public interest. This section briefly describes how platform characteristics can result in market failure. Note that there may be other reasons to intervene in a market, which we do not consider in this section—that is, market failure is just one of the ways we can use to illustrate the link between characteristics and interests. Obviously, the analysis presented in this section is insufficient if specific policy interventions are considered. It does, however, offer an overview of the public interests that may be relevant based on the characteristics of a platform.

The first public interest in the framework is competition and innovation. Competition refers to interaction among market players that is driven by rivalry in which every actor tries to maximize its long-run profits. Generally, a lack of competition results in market power allowing firms to set high prices and make high profits. Innovation may be hampered by a lack of competition, but not necessarily as monopoly rents may incentivize innovative activities by others.<sup>10</sup> Market power becomes a problem when rival interactions are not based on merit, and a firm is able to set terms and conditions (including prices) to a considerable extent independently of its competitors. This is a relevant consideration in the analysis of competition, but also for the other public interests. For instance, without market power it is unlikely that firms can lock in customers. The risk of violations of fundamental rights by a platform is also higher if there are insufficient alternatives for consumers.

As explained, digital markets may tip into a winner-takes-all outcome because digital business models often aim to internalize network effects. This involves certain efficiency gains as network effects are maximized when everyone is using the same platform.<sup>11</sup> The risk of tipping markets may increase due to other business model characteristics that influence market power: such as economies of scale and scope, the use of data, and horizontal and vertical integration. If a platform is used by other platforms, there is a risk of the platform attaining a gate keeper position, which may allow it to act independently of others and no longer compete on merit. However, there can be a number of mitigating factors that constrain the market power of a platform, even when it has a high market share or realizes excessive profit margins (Batura et al., 2015). Service providers often have multiple routes to deliver digital services to end users, and service providers as well as users may multi-home. This makes a market contestable such that digital platforms are constantly challenged by outsiders to redefine their business models.<sup>12</sup> Prüfer and Schottmüller (2016) formally work out a scenario in which the accumulation of a big data advantage (functioning as a turbo on learning and network effects) may allow a company to monopolize one market after another and, therefore, kill the dynamics of the digital economy. Prüfer and Schottmüller (2016) argue that such a scenario should be prevented by imposing an obligation to share or port data. However, Van Til et al. (2017) conclude that the risk of such a scenario depends on several factors which are often not met,<sup>13</sup> and that an obligation to share or port data faces substantial design challenges and may distort incentives to innovate.<sup>14</sup> Digital innovations not only aim to contest strong positions in other digital markets. Digital business models also seek to disrupt more *mature markets* in the physical world: e-commerce platforms disrupt the brick-and-mortar retailers; digital ride- and car-sharing platforms disrupt taxi markets; booking and home-sharing platforms disrupt the hotel industry; etc. From an economic perspective, such disruptions are generally welcome as they address certain market failures such as market power or information asymmetries. However, while challenging the boundaries of mature markets, digital innovators may also challenge the boundaries of the law. In order to ensure a level playing field, there is a public interest in competition rules being applied equally to the market players. For example, the sharing website [thuisafgehaald.nl](https://thuisafgehaald.nl) allows users to

offer meals to other users and thereby (indirectly) competes with suppliers in the prepared-food market who are subject to taxes and regulation on food safety.<sup>15</sup>

Innovative activities can be divided into product innovations and process (including marketing and organizational) innovations. Many characteristics of digital platforms enable new ways to organize value chains which result in process innovations. Platforms that are used by other platforms play a vital role in this innovative process. In this way, they have some of the characteristics of a “general purpose technology,” which is a technology that leads to productivity growth in a wide range of sectors through spill-overs.

The second public interest is consumer interests. Consumer choice is closely related to competition. If a platform abuses its dominant position, this would be detrimental to consumer interests (Guibault et al., 2013). Moreover, consumer choice can be restrained if the consumer is locked in, thereby impeding competition. Consumer lock-in may result from network effects in combination with a lack of interoperability or interconnection between platforms, which make it difficult to switch to a competing platform if there is a lack of interplatform operability (Martens, 2016). This is especially the case for communication platforms and platforms of platforms, which can act as gatekeepers.

Consumers often do not have the same information regarding the quality and safety of a platform as the platform itself (Zuiderveen Borgesius, 2015). Such an information asymmetry can, similar to market power, result in market failure. None of the platform characteristics in themselves result in information asymmetry, but consumer protection (in the dimension of security and privacy) becomes more important as more user data are gathered by a platform. As such, the revenue model may also be a relevant characteristic to consider. In particular, in the advertising model the interests of the users on a platform are not always aligned with the interests of the platform. This can be a justification for government intervention to protect consumer interests, for example, by imposing transparency obligations.

The previous section discussed the risks of information asymmetries on digital platforms, but platforms can also reduce information asymmetries as they bring buyers and sellers together and offer transparency on prices. The quality of a service or product can also become more transparent as many platforms support user-submitted reviews, which can reduce information asymmetries.

Note that even if a platform does provide information to consumers, they may not act in their best interest (this is also known as bounded rationality). An example is the provision of elaborate descriptions of the terms and conditions for using a platform. The information is often so elaborate that end users simply accept without reading. This can also be a justification for government intervention in the market to protect consumer interests.

The third public interest is freedom from improper influence. In order to have any proper or improper influence, a platform has to have a certain amount of (market) power. For this reason, all of the platform characteristics mentioned in the earlier discussion of competition and innovation are to a certain extent relevant for this public interest as well. The use of a platform by other platforms relates to the

public interest of freedom from improper influence, as platforms that are used by other platforms can set conditions for access to platforms which may result in improper influence (Helberger, Kleinen-von Königslöw, & van der Noll, 2015).

The way data are used also relates to the risk of improper influence. Digital platforms provide a powerful medium to express opinions and to share information. In this way, platforms can contribute to pluralism and diversity. The downside of this fundamentally positive characteristic is that there is also a risk that the platform itself or others (i.e., governments) that have access to the data can use it improperly. Moreover, certain digital platforms may restrict certain discourse and modes of discourse (Andersson Schwarz, 2017), which may impact on the freedom of expression and communication of users. Of course, there are big differences in how freedom from improper influence is interpreted between countries. Therefore, geographical dependencies (difference in tastes and customs) may also have to be considered.

The final public interest is integrity and continuity. It is often difficult for individual users to obtain information about the integrity and safety of a platform, given the information asymmetry between users and platform owners. The more user data are used by a digital platform, the more important the public interest of integrity becomes. Continuity is especially important for platforms that enable the functioning of other platforms (i.e., platforms that are used by other platforms). For the same reason, continuity risks increase with the level of horizontal integration of a platform.

*Instruments.* The third component of the analytical framework covers the government instruments and their application (the rightmost column in Figure 1). Before considering what policy instruments the government may or may not adopt to protect public interests, a number of preliminary considerations need to be taken into account. These include taking account of regulation already in force, whether this regulation is sufficient to protect public interests, and whether national and European regulators are actively enforcing this regulation in digital platform markets (cf. Schulz & van Eijk, 2015). Table 2 sets out these considerations.

First, it seems appropriate to consider the instruments which are already in force, and whether these instruments already provide or can provide sufficient protection for these public interests. Claiming the need for new regulation implies that existing instruments do not work and putting new rules in place means more or less that nothing can be done before new rules have been put into place (a process which can take years).

In this article, the focus is on EU instruments. The EU's competence extends into many areas of regulation related to digital platforms, and several categories of existing instruments can be distinguished which are more specifically related to digital platforms. Some of them are of a more generic nature such as competition law, dealing with abuse of dominant position, anticompetitive agreements and mergers and acquisitions. For example, the Consumer Rights Directive 2011/83/EU applies to contracts between a trader and a consumer, including contracts concluded on the Internet (European Parliament and Council

**Table 2.** Generic Considerations With Respect to the Adoption of Instruments

Topic	Considerations
Existing/nonexisting instruments	What generic or sector specific regulation/instruments are already in place? Are areas—related to digital platforms—not covered (completeness of the tool box) and should they be covered?
Application and enforcement	Are regulatory frameworks implemented in practice, and are regulators actively enforcing, or attempting to enforce, regulation to digital platforms?
Static/dynamic	Digital platforms are in transition and require a more normative/functional approach instead of the overly detailed regulation common to static markets
Risk/harm <i>ex ante</i> / <i>ex post</i>	Policy question on weight to be attached to certain public interests, that is, higher risk of harm might suggest <i>ex ante</i> regulation, while lower risk of harm might suggest <i>ex post</i> regulation; risk/harm approach can be used to assess innovation opportunities
Subsidiarity	How much space have (or should have) national governments to intervene with generic and sector-specific regulation, taking account of EU regulation?

of the European Union, 2011). The directive includes rules on price transparency, pre-ticked website boxes, withdrawal rights, and refund rights. Further, the Race Equality Directive (2000/43/EC; Council Directive, 2000b) prohibits indirect and direct race discrimination, including in relation to the supply of goods and services which are available to the public, including housing.

Other instruments are more sector specific. The E-commerce Directive 2000/31/EC includes rules on the transparency and information requirements for online service providers, commercial communications, electronic contracts, and limitations on the liability of intermediary service providers (European Parliament and Council of the European Union, 2000). In the area of labor rights, there is a large body of EU law, including the Working Time Directive (2003/88/EC; European Parliament and of the Council, 2003) on rest periods, annual leave, shift work, and patterns of work; the Safety and Health at Work Directive (89/391/EEC; Council Directive, 2009); the Temporary Agency Work Directive (2008/104/EC; European Parliament and of the Council, 2008) on protection of temporary agency workers; and EU law to protect against employment discrimination, provided in the Equal Treatment in Employment Directive (2000/78/EC; Council Directive, 2000a). Finally, the Audiovisual Media Services Directive 2010/13/EU sets out the rules for broadcasting and also for on-demand audiovisual media services, such as online streaming services (European Parliament and Council of the European Union, 2010). The European General Data Protection Regulation 2016/679 sets out obligations for companies that process personal data, including that processing must be legal and fair, data must be collected for legitimate purposes, and individuals can rectify, remove, or block incorrect data about themselves (European Parliament and Council of the European Union, 2016). Also, the ePrivacy Directive 2009/136/EC requires that member states ensure websites have a user's consent before placing or accessing certain cookies on a user's device (European Parliament and Council of the European Union, 2009).

We observe that existing instruments are particularly relevant when digital platforms “meet” the offline world. Health and safety regulation is relevant when platforms facilitate the delivery of food, for example, in a shared economy mode. Public safety and housing rules continue to apply to renting apartments. Transport regulation continues to apply to ride-sharing platforms, as confirmed by Case C-434/15 (EU Court of Justice, 2017) and Case C-320/16 (EU Court of Justice, 2018).

A second consideration is whether instruments currently in force are being adequately implemented, and whether regulators are actively enforcing, or attempting to enforce, regulation that may apply to digital platforms. European regulatory frameworks can offer substantial scope for further developing and detailing these frameworks with complementary national implementation. Where rules are unclear, bylaws and guidelines can support and strengthen enforcement. The application and enforcement system is complemented by court decisions. Jurisprudence—although sometimes a lengthy process—can contribute to the interpretation of rules, and to the legitimacy of regulatory activity by the authorities. For example, courts have provided guidance on the applicability of the e-commerce directive and on the relevance of proper protection of privacy.

As the analysis of the business models shows, digital platforms are subject to almost constant development and change. This conflicts with a traditional regulatory approach dealing with more static situations. Due to this characteristic, a more normative/functional approach is required instead of the overly detailed regulation common to static markets. Therefore, it may be necessary to move toward “principles-based regulation” as opposed to “rules-based regulation” (Schulz & van Eijk, 2015, p. 55). On the one hand, principles-based regulation relies upon substantive standards or objectives imposed on industry stakeholders to achieve legislative purposes. It imposes a general standard for conduct—leaving it to the discretion of regulators to decide if particular conduct should trigger a sanction. On the other hand, rules-based regulation relies upon detailed, prescriptive requirements, specifying in advance what specific actions will be penalized. It specifies the trigger for a sanction and, at times, the specific sanction to be imposed. A further consideration is the policy question of the weight to be attached to certain public interests, and how this will impact upon the regulatory approach. Depending on this assessment, there might be a choice to be made between *ex ante* and *ex post* intervention. If consequences cannot be undone or fully compensated, the need for *ex ante* regulation might be greater. A similar approach could be used to set minimum/maximum requirements (although this might conflict with the need for sufficient flexibility). In the context of digital platforms, assessments about *ex ante* or *ex post* interventions could be based on a risk/harm analysis.

Subsidiarity (i.e., the EU only acts if the objectives of the proposed action cannot be sufficiently achieved by member states, and can instead, by reason of the scale or effects of the proposed action, be better achieved at EU level) is an important concept in EU regulation and can be looked at from several perspectives. No European intervention, or European intervention with (substantial) space for national implementation, can guarantee sufficient space for national

governments to act quickly and to take into account differences between member states. This would potentially benefit dynamic sectors such as digital platforms. However, subsidiarity can represent an obstacle for harmonization, while harmonization might represent the risk of creating an overly static situation.

*Instruments and Enforcement.* Based on the considerations above, a number of policy options arise (Figure 4) that are elaborated below.

A first policy option would be to remove existing regulation. The existence and innovation of digital platforms may remove the need for current regulations, as the original rationale for such regulations may no longer apply. An example would be the continued need for a taxi regulations requiring taxi meters, when digital platforms offering taxi services decide price and route before journeys. The relevant interest—transparent pricing—is still safeguarded with a more normative/functional approach. However, Rosenblat et al. (2017) have discussed the new challenges that may also arise to transparent pricing from digital platforms such as Uber. Indeed, the EU Court of Justice held that Uber exercises “decisive influence” over the conditions of the service that is provided by its drivers (Case C-434/15). This included Uber determining “at least the maximum fare by means of the eponymous application, that the company receives that amount from the client before paying part of it to the non-professional driver of the vehicle,” and that Uber exercises a “certain control over the quality of the vehicles, the drivers and their conduct, which can, in some circumstances, result in their exclusion” (Case C-434/15, para. 39).

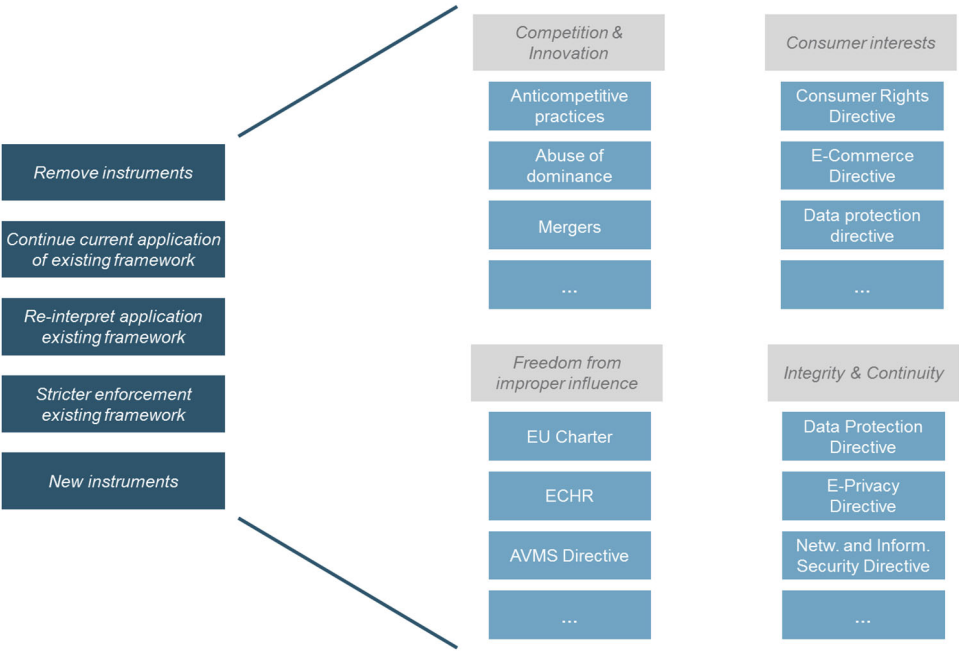


Figure 4. A Further Breakdown of Policy Instruments and Enforcement.

Given the breadth of current European Union (EU) regulation, and further proposed EU regulation, one can in many cases rely on the application of existing frameworks. Competition law is a clear example in this context, because it offers a flexible approach that is able to deal with digital platforms. In many instances, whether a current regulation applies to a digital platform is a matter of interpretation, and it is the competence of courts to decide upon this interpretation. One of the most well-known examples is the Google Spain judgment (Case C-131/12) issued by the EU Court of Justice (2014), holding that search engine operators are personal data “controllers,” and individuals may, under certain circumstances, request that certain search results be removed based on a search for an individual’s name. In a similar vein, the EU Court of Justice gave its interpretation on whether Uber is a transport service or an “information society service” under the Services Directive, and held that it must be classified as “a service in the field of transport” (Case C-434/15, para. 40). Thus, the Court confirmed that Uber exercises “decisive influence” over the conditions under which its service is provided by its drivers. The Court also found in 2018 that UberPop was “not essentially different,” and similarly “cannot come with the scope” of the Services Directive (Case C-320/16, para. 25). Moreover, reinterpretation avoids “white spots” in regulation which would take years to become regulated. Finally, legislatures may also provide new interpretations of existing regulation, taking account of new insights based on market developments or technological innovation. This can contribute to a more granular approach.

Another option is use the existing framework to a fuller extent by enforcing it more strictly in situations where this is called for. Here, we see different approaches and options, depending on the authorities involved, including:

1. *Targeted enforcement by national authorities.* Following an evaluation of current regulation and enforcement, it may be that national regulators need to adopt a more targeted enforcement of certain digital platforms. In several EU member states, regulators are giving more priority to issues related to digital platforms.
2. *Targeted enforcement by European authorities.* It may be that European authorities are best placed to engage in targeted enforcement in certain digital platform markets (such as cross-border). The most relevant example of targeted enforcement would be the European Commission launching an antitrust investigation into the e-commerce sector (European Commission, 2015a). It should be noted that applying general EU competition law may result in lengthy procedures with the risk of not matching the urgency of the case.
3. *Cross-border regulatory enforcement.* Regulators from a number of jurisdictions may be best placed to properly enforce the current regulatory framework. For example, the Dutch Data Protection Authority and the Canadian Office of the Privacy Commissioner launched a collaborative investigation into the communications app WhatsApp, which resulted in behavioral changes, and better protection of data and privacy by WhatsApp (Dutch Data Protection Authority, 2013). Further, regulatory action in one jurisdiction may have implications for

platform users in other jurisdictions, where a platform's policy response to national regulatory action may be adopted globally by the platform.

4. *Increased support for national and European regulators.* Given the increased activity of digital platforms in certain markets, it may be that national regulators do not have the resources (funding, expertise, remedies, etc.) to adequately enforce current regulation. In this regard, increased support may be the most appropriate response, such as the Irish government substantially increasing the funding made available to the Irish Data Protection Commissioner, given the operations of many large digital platforms in its jurisdiction.

A final policy option would be to develop "new" instruments. This need not be the blunt instrument of legislation, but could include instruments such as self-regulation, co-regulation, and remedies aimed at behavioral change. Self-regulation would include digital platforms adopting among themselves, and for themselves, common guidelines (such as codes of practice or sectoral agreements). Self-regulation needs to be carefully assessed as an instrument because, in general, it lacks effective enforcement. By contrast, co-regulation would include a framework of overall objectives, basic rights, enforcement, and appeal mechanisms, and conditions for monitoring compliance which is set in legislation. Co-regulation combines binding legislative and regulatory action with actions taken by the actors most concerned, drawing on their practical expertise. The result is wider ownership of the policies in question by involving those most affected by implementing rules in their preparation and enforcement. This often achieves better compliance compared to self-regulation (European Commission, 2001). And finally, behavioral change remedies already exist in competition law (the so-called "binding agreements" refer to agreements between regulators and organizations on future behavior). However, comparable remedies are often lacking in sector-specific regulation, but can be introduced via national regulation or harmonized via European intervention (cf. Van Eijk, Hoofnagle, & Kanckens, 2017).

When it is considered necessary to adopt or optimize legislation, a range of instruments are available. Table 3 shows four possible inroads for regulation. The figure models regulation and intervention based first on whether regulation is generic or specific, and second whether or not it is digital platform related. In the lower-left corner are positioned generic instruments which affect digital platforms but without being specifically aimed at them. General competition and consumer law fall into this category. These instruments have the advantage of being broad and flexible, but need to be further framed in order to be useful. These nonspecific general instruments are complemented by instruments that are also generic, but sector specific (lower-right corner, an example being the Audiovisual Media Services Directive), and instruments that have a direct effect on digital platforms but are still of a generic nature (upper-left corner: the e-commerce directive falls clearly into this category). Finally, the upper-right corner deals with specific digital platform instruments. At the moment, this type of regulation does not exist, and the EC has also indicated that it is not aiming to introduce such measures (European Commission, 2016d).

**Table 3.** Four Possible Inroads for Legislation

Generic/Specific Digital/Nondigital	Generic Regulation/ Intervention	Specific Regulation/ Intervention
Digital platform	Generic digital platform (e.g., e-commerce directive)	Specific digital platform (nonexistent [yet])
Nondigital platform	Generic, nonsector specific (e.g., competition law)	Generic, sector specific (e.g., AVMS directive)

*Note:* AVMS, Audiovisual Media Services.

The typology helps to determine what the available options are for intervention. The dynamic character of digital platforms implies that specific regulation for digital platforms has fewer possibilities to deal with quickly changing environments. On the other hand, generic, nonsector specific instruments can provide great flexibility, but can only be effective if they are sufficiently framed by lower regulatory instruments or guidelines.

Finally, in the discussion of policy instruments, this article provides a set of relevant considerations in the application of public policy. These considerations are focused on the choice between policy instruments. In practice, digital platforms can also change the way in which specific instruments can be applied. An example is tax policy. On digital platforms that have the characteristics of a marketplace, there is a risk that users who operate as businesses do not pay corporate taxes. The surveillance methodologies that tax authorities use on digital platforms are different from surveillance in traditional industries. Another example is competition policy. Traditionally, the market power of a firm is assessed based on the market share and profit margins. This is often challenging in traditional industries but it is even more so for digital platforms, as firms might have no revenues at all (following the acquisition model) or might charge users on one side of the platform but not on others. This means that tax authorities and competition authorities have to continually revise their toolkit, and have to apply new methodologies in tax and competition policy in digital platform markets.

### Illustration of the Framework With Forward and Return-Path Analysis

This section describes a structured approach for using the framework. The approach is presented in Figure 5 and essentially is made up of two main parts. The first part or forward route, shown in the top half of the figure, is about determining the relevant platform characteristics and selecting the platform type. Next the impact of these characteristics is determined for each public interest. From that analysis, the need for intervention and potential interventions are deduced. Multiple potential interventions may be considered.

The second part or return route, shown in the bottom half of the figure, is about analyzing the effects of the potential interventions based on the considerations presented in the previous section. For each potential intervention, the impact on the characteristics of the platform concerned is determined, taking into account second order effects, as the digital platform itself will respond to an

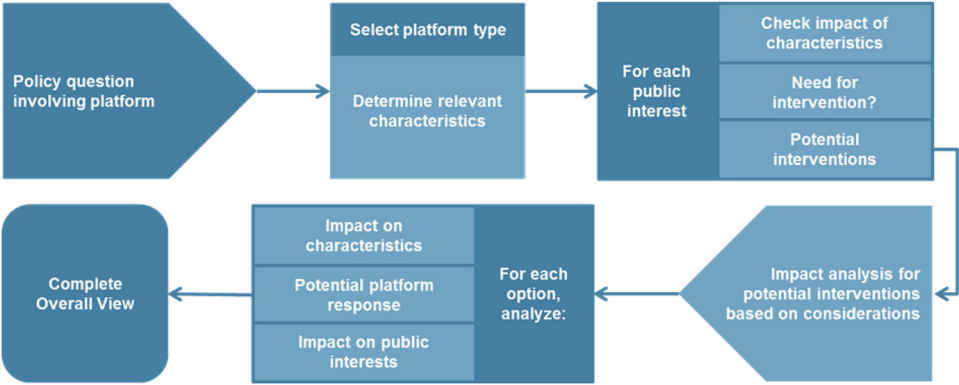


Figure 5. A Structured Approach to Using the Framework: Forward Route (Top Half) and Return Route (Bottom Half).

intervention as well. The impact of an intervention on other public interests is also determined, using the adjusted platform characteristics as a starting point.

It is important to keep in mind that the analytical framework is not a straightforward decision tree. First, as Figure 5 clearly shows, there is a return route that provides a feed-back loop in the analysis. Second, and more importantly, the framework involves a policy or political weighing of different options for the promotion of public interests or the applications of instruments. The framework does not attempt to capture this weighing process.

Stakeholders can be involved in both parts of the analysis approach. Important questions that may be answered best by involving the stakeholders of the digital platform that is considered, include how the digital platform impacts the public interests and, subsequently, how potential interventions impact the digital platform. These questions reflect the direct impact of the digital platform on public interests and the direct impact of potential interventions on the digital platform. As usual when involving stakeholders, the interests of these stakeholders should be kept in mind, particularly the digital platform under study itself, and their input weighted accordingly. To prevent too much single-sided input, various stakeholders reflecting various interests in the case at hand can be involved, for example, not only the platform itself but also competitors, sector experts, consumer organizations, trade associations, etc. Determining the potential interventions themselves is up to the policymakers and politicians. The impact of interventions on (other) public interests is also more a concern for policymakers and politicians, and less for the digital platform itself. To involve stakeholders for dealing with these aspects of the analysis, therefore, seems less relevant.

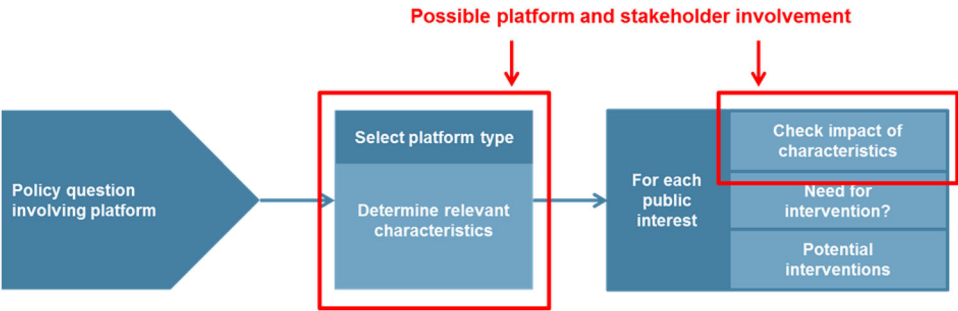
The analysis starts first with a policy question. There may be different situations in which policymakers decide to use the analytical framework. The framework in principle covers both situations in which a specific platform is concerned and situations in which a general development with respect to digital platforms is to be analyzed. A platform-specific situation may be that a digital platform seems to impact certain public interests. For example, consumers are

becoming worried about their online privacy, which may be the trigger for having a closer look at the digital platform involved. Further, an example of general “motives” for applying the framework may be policymakers may feel a need to have a thorough understanding of a certain type of digital platform, for example, they want to better understand the implications of the sharing economy, the impact of a new breed of large multinational and multi-sided business-to-business marketplaces, or of the impact of large foreign platforms of platforms.

For reasons of bringing focus to the analysis, it is advised to always start the analysis from a concrete policy question. The benefit of this approach is that it leads to an articulation of the public interests that are relevant (for instance, because they are thought to be in jeopardy) to the case at hand. Just analyzing a type of digital platform can become a very broad and extensive exercise leading to a general discussion without any concrete outcomes. Instead, focusing the analysis on a specific policy question will help to direct discussions toward a constructive outcome. In case stakeholders are being involved, this can be further promoted by first sharing the goal of the analysis with these stakeholders.

After determining the policy question from which to start the analysis, first the “forward direction” is taken as shown in Figure 6. From determining the relevant characteristics of platform, the platform type is derived. Next, the possible impact of the characteristics on the various public interests is analyzed. From this, the possible need for interventions and potential interventions are determined.

It is recommended to involve the digital platform and the other relevant stakeholders in determining the relevant characteristics of the platform and the impact of these on the public interests. This allows for creating a shared view on the platform and its impact on public interests, which is at the core of deciding if and what policy action may be needed. Consulting the stakeholders early on helps to create a shared view of the situation at hand, which will help to reduce possible resistance to any outcome of the analysis later on. Also, by addressing the relevant stakeholders in these first steps, the reason for the analysis can be explained. This will help in keeping the stakeholders connected throughout the process.



**Figure 6.** Forward Route in the Framework: Going From Platform Characteristics to Potential Interventions.

An important step in determining the platform characteristics is to determine the business and revenue model of the platform involved. It is this business model that is key to understanding the digital platform, in seeing how the various platform characteristics add up to form a consistent overall picture. Basically, the business model will determine the strategy of the platform owner and will thus determine how the platform will evolve over time.

After the business model has been determined, the next step is to go through the list of characteristics presented in the first section. All relevant characteristics for the digital platform or kind of platform (e.g., “sharing economy” in general) concerned should be addressed. Figure 1 from that section can be used as a graphical tool to assist in this work, especially when doing the analysis by means of a group exercise. By drawing arrows between the various boxes and by adding descriptive text to the relationships, the complete picture of the platform becomes visible. The platform type can be determined either beforehand, based on common knowledge of the platform, or further along the process and once the various characteristics have been determined. Determining the platform type will help in getting a general feeling for the complexity to be expected in the analysis. Note that for the considerations on public interests and instruments later on, the platform characteristics are used rather than the platform type.

As a next step, the relation(s) between the platform characteristics and public interests are to be determined (these relations and their possible impact have already been described in the first section). This is done by going through the list of public interests already presented one by one, assessing the possible impact of every relevant platform characteristic (from the previous step) on each of the public interests at stake. A relevant question here is to assess whether the platform is capable of having an impact on the public interests, and if it is in the interest of the platform to do so. Figure 1 can be used as a graphical aid to create an overview of all platform impacts on public interests.

Based on the overview of possible impacts that has been constructed, policymakers need to assess whether an intervention is called for at all. For each public interest impacted by the platform, policymakers will need to determine if the impact requires and justifies an intervention. Note that not only a “negative” impact may warrant intervention, but that a lack of (or insufficient) “positive” impact may also be a reason to intervene.

If, as a result of the above exercise, a need to intervene has been identified, the potential policy instruments are to be determined. Here, the list of instruments presented in the first section can be used to help in selecting potential instruments. After the potential interventions are selected, the broader impact they might have on the digital platform itself and on (other) public interests has to be analyzed. This analysis starts from determining the impact the selected potential interventions have on the platform characteristics. When they give rise to a change in the platform characteristics, so does the impact the platform has on the public interests. Figure 7 shows this “return route” in the analytical framework.

Note that this return route is an impact analysis, and will contain assumptions and estimations necessary to arrive at the estimated impact.

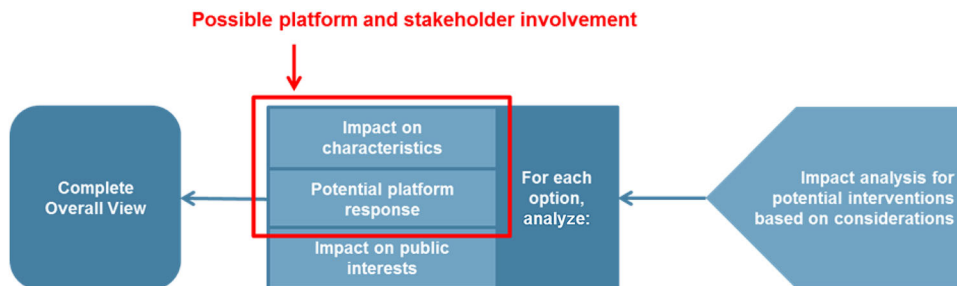


Figure 7. The Return Route in the Analytical Framework.

Especially for the potential platform response, a good prediction may be difficult to achieve. To deal with this, various “what if” scenarios may be defined, to investigate the impact of various platform responses. Still, an eventual (policy) decision will, as with any decision, be based on incomplete information, given it is impossible to predict the future.

As a first step in analyzing the impact of a selected potential intervention, the impact it has on the platform characteristics must be assessed. This is done by going through the list of platform characteristics already presented. As a visual aid, Figure 1 can be used, creating an overview for each potential intervention that is being analyzed. Depending on the interventions that are analyzed, it may be necessary to consider the impact on characteristics of other platforms as well, as these can also be affected by the interventions.

Next, the platform response (or responses, in the case of multiple platforms) to the intervention needs to be estimated. Most likely, the digital platform will respond to interventions in a certain way, thereby potentially changing the effect the selected instrument would have on other characteristics. Just like before, the business model is a key characteristic, because any impact on this will severely impact the various other characteristics as well. Also in this step, stakeholders can be involved. Stakeholders will be able to present their view on the impact an intervention may have, and any suggestions or objections stakeholders may have can be collected while consulting them. Again, be aware of the interests of the various stakeholders consulted, as they will provide input based on them.

Next is the analysis of the impact of the changing platform characteristics on the public interests, which is very similar to the analysis on the forward route in the framework, described in the previous section. Only where changes are expected in the platform characteristics, do these need to be analyzed anew. From this exercise, it can be seen if the intervention actually achieves what it was intended to achieve, namely to impact a certain public interest in a certain manner. Moreover, from this exercise it will also become clear if there is an impact on other public interests, be that directly or indirectly. It should be stressed that the return route is as important as the forward route. It closes the loop: is the policy question adequately addressed? Is the situation that was the motivation for doing the analysis sufficiently dealt with? Has the analysis

discovered relevant new policy questions, perhaps even of greater importance than the original question that started the analysis?

Once the above steps have all been carried out, a complete view has been created of the digital platform and its impact on public interests, and of the impact of potential interventions. Based on this overall view, decisions can be made to actually carry out certain interventions or not. In theory, the framework as presented in this article could be used in an iterative way. As potential interventions change the platform characteristics, and the impact thereof on the public interests, new interventions could be thought of to counteract these new effects. Even though such an iterative use is certainly possible, it is not recommended as it makes using the framework overly complex and less certain. The analysis leans on estimations of effects, and doing this in an iterative fashion will lead to introducing more uncertainty about the outcomes of the framework analysis, as estimation errors will multiply in each iteration circle.

In the previous section, the framework was introduced with an emphasis on the forward direction: from platform characteristics to public interests and then on to instruments. In this section, we illustrate this path using the Facebook case study as an example. We also illustrate the analysis of the return-path, in which we analyze the impact on the characteristics of the platform, taking into account second order effects, as the digital platform itself will respond to an intervention as well. The impact of an intervention on other public interests is also determined, using the adjusted platform characteristics as a starting point. Since the goal of this study is to develop a generic framework and not to provide policy advice for a specific platform case, we do not consider the use of existing or new instruments for the Facebook case. To illustrate the return-path in the analytical framework, we consider a (fictitious) social network application, different from Facebook, driven by a direct payment (subscription) revenue model. If the framework is applied to a case with the goal to analyze specific issues or questions, a further level of detail would need to be added.

It is important to keep in mind that the framework is not a straightforward decision tree, as will become clear from the example. First, there is the return route that provides a feed-back loop in the analysis. Second, and more importantly, the framework involves a policy or political weighing of different options for the promotion of public interests or the applications of instruments. The framework does not attempt to capture this weighing process.

### **Applying the Framework to Facebook**

With around 1.9 billion monthly active users, Facebook is the world's largest social network today. Facebook has integrated a number of related applications, such as video, messaging, and photos in its main social networking app (Facebook, 2017).<sup>16</sup> Facebook has also made a number of substantial acquisitions, including WhatsApp<sup>17</sup> and Oculus.<sup>18</sup> At the time of writing, the WhatsApp messenger and the Oculus devices are offered separately from Facebook's main social networking applications. Facebook's primary revenue model is advertising:

it offers targeted advertising based on the information it has available on its social network user.

The evaluation of Facebook's platform characteristics and their relation to public interests is shown in Figure 8.

In the coarse typology of platforms, Facebook best matches the Social Network category. As will be seen below, because of some of its characteristics there is also a partial match with the "Platform of platforms" category. The next step is the evaluation of the platform characteristics, as follows:

- Facebook's dominant *revenue model* is advertising. Advertising accounts for over 98 percent of Facebook revenues.<sup>19</sup>
- The *direct network effects* of the Facebook platform are strong, as the value of Facebook for its users strongly depends on the number of other users and friends. The direct network effects have an impact on competition and innovation. First, the direct network effects introduce a substantial entry barrier for potential competing social networks. At the same time, the direct network effect brings the value and scale to the Facebook innovations. From the consumer interest perspective, the direct network effect created by a large group of Facebook friends makes it hard to switch from Facebook to another social network. Multi-homing, that is, using multiple social networks in parallel, is common. This means that the *actual use* that users make of a social network is more important than whether or not they have an account.

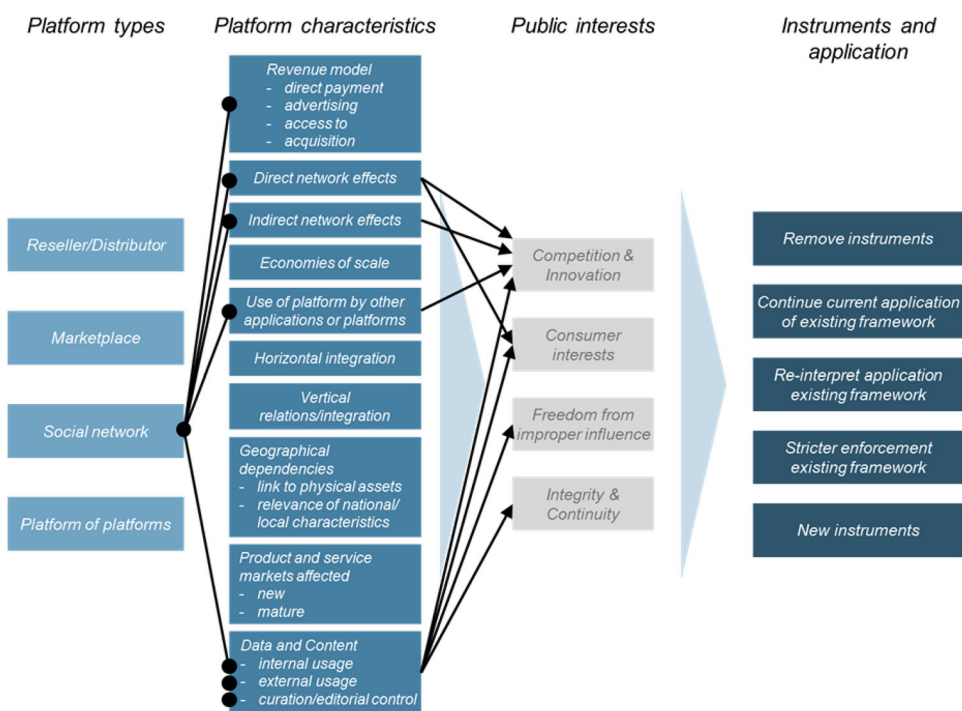


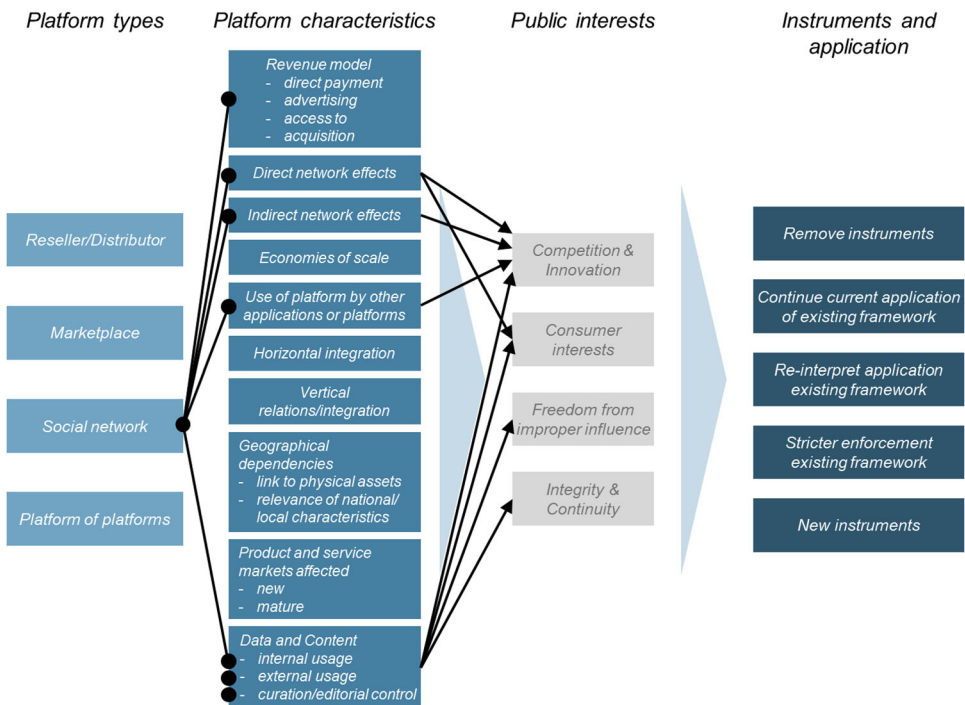
Figure 8. Overview of Facebook Platform Characteristics and Their Relation to Public Interests.

- The *indirect network effects* of the Facebook platform are strong as well, as the value of Facebook for advertisers strongly depends on the number of users. The strong indirect network effect makes it difficult for potential competitors to create a targeted advertising offer that matches Facebook's. Also, for large companies and small and medium-sized enterprises, Facebook cannot be missed as an interaction channel with their customers. At the same time, the presence of these indirect network effects show that advertisers and companies benefit from Facebook's success in attracting a large group of users.
- Facebook's *economies of scale* are moderate. Its global brand and scale enables Facebook to attract mobile operators in many developing countries to the internet.org project.<sup>20</sup>
- The *use of the Facebook platform by other platforms* is moderately strong and has an impact on both competition and innovation. Facebook plays an important role in the distribution of many (casual) games. For the games providers, the Facebook platform is important because of the indirect network effect. Other major applications (e.g., Airbnb) use the Facebook login mechanism, typically as an alternative to their own mechanism. Furthermore, many websites use Facebook's Like button and comment fields. These examples show that many companies use and benefit from the Facebook platform. They, therefore, depend to some degree on Facebook, but they have a choice in other platforms and distribution channels.
- The Facebook platform shows a moderate degree of *horizontal integration*. The additional products that Facebook offers (such as Messenger, Video, and Photos) stay close to the main social networking product.
- Facebook shows substantial *vertical integration* in several areas. It operates an extensive data center infrastructure that supports its service. Facebook has moved into devices (earlier Facebook Home Android overlay, acquisition of Oculus).
- Facebook's offering currently has limited *geographical dependencies*, as it provides essentially the same service to its global customer base.
- The *data and content* is used for both internal and external purposes and is also subject to curation and editorial control by Facebook. Facebook uses the (partly personal) data and content provided by its users internally, for example, in the news feed of the Facebook service. Facebook's attraction for its users, and also much of its competitive strength, is in its innovative use of data provided by the users themselves in ways that they find useful. This internal use of data occurs in parallel to its external use in targeted advertising. Based on underlying data that stays within Facebook's domain, advertisers can choose their audience by location, age, interests, and more. Facebook's use of personal data and content strongly links to users' right to privacy and right to data protection, and the integrity and security of (personal) data. Facebook exercises editorial control according to its own community standards.<sup>21</sup> Because of its large user base, Facebook is an important platform for sharing of news and opinions, which links Facebook's editorial control to freedom of expression.

## Applying the Framework to Mandatory Portability of Personal Data

To illustrate the return path in the analytical framework, we consider a (fictitious) social network application driven by a direct payment (subscription) revenue model. The social networking platform exhibits strong direct network effects. We assume that the data that users provide to the social network is used only within the platform. For the purpose of this example, we analyze the impact of mandatory portability of personal data on the characteristics of this platform, and further on public interests. The mandatory portability of personal data is an instrument contained in the recently adopted European General Data Protection Regulation 2016/679 (European Parliament and Council of the European Union, 2016). Figure 9 shows a compact analysis of the impact of this instrument on the fictitious platform.

- The data portability does not affect the *direct network effect* itself, as it is still attractive to be part of a large social network. Portability does make the direct network effects more vulnerable as groups of users can move more easily to another platform. From the consumer interest perspective, a user gets more control over his personal data and the barrier to become an active member on another social network becomes smaller. This is an intended effect of the proposed portability. From the competition and innovation perspective, portability decreases the entry barrier for new, competing social networks.



**Figure 9.** Overview of Impact of Portability Instrument on (Fictitious) Social Networking Platform.

It may shift the mode of competition from “compete for the market” to “compete in the market.”

- The portability affects the platform’s internal *use of data*. From the competition and innovation perspective, portability may make it less attractive to innovate in internal use of new data as these data need to be portable as well, giving away a potential head start. Innovations also bring a need for updates of export formats which requires work and coordination/standardization between platforms. Platforms may react with “common denominator” approaches to defend their interests. Portability can also be considered as a new type of external use of the data, not driven by platform owner, but by consumer. As indicated above, this is an intended effect of the proposed portability. At the same time, it will cause data to cross company/platform domains, potentially introducing security vulnerabilities. It can also lead to inconsistencies in data sets that have been used in parallel in multiple social networks.

## Conclusions

The framework presented provides a structured approach that promotes completeness and consistency for the analysis of the government role and policies for digital platforms. The sets of platform characteristics and public interests in the framework can be expected to cover the relevant key points for such an analysis. The platform characteristics are a core starting point for the analysis and—combined with the set of public interests—take the central role, both in the forward direction (from platform characteristics to public interests to instruments) and in the backward direction (from policy interventions to a platform’s response, which may affect its characteristics). Through this approach, a consistent overall view is created.

The framework may be shared with stakeholders to provide transparency on policy development and also to obtain their perspectives on platform characteristics, public interests, and instruments as input for the analysis. Note that the analytical framework presented in this report is not a straightforward decision tree—for two reasons. First, there is a return route that provides a feed-back loop in the analysis (similar to an impact assessment). Second, and highly important, the framework allows for weighing different policy options. The framework does not attempt to capture this weighing process as such, but does recognize the importance of it and urges policymakers to explicitly include it in the policy analysis.

Each digital platform is different and sometimes acclaimed to be unique; therefore, the analysis of the set of platform characteristics is the only relevant starting point for the analysis. This approach is more useful than trying to match specific platforms to a category in a predefined, generic typology of platforms: this is more typical for a bureaucratic approach, ignoring the dynamic aspects of the sector. The analysis at the level of the characteristics clearly does more right to the dynamics and richness of digital platform features than a stable, but necessarily limited, typology.

Most of the characteristics that are of particular relevance in digital platforms are also relevant in cases that do not involve digital platforms, but the dynamics might differ substantially. In fact, our analysis has not identified economic or technical characteristics that are unique to digital platforms. Certain characteristics (such as network effects and use of data) are more pronounced and relevant in many platform cases, but this does not warrant a delineation of digital platforms through a specific definition with the goal to introduce platform-specific regulation. This view is reflected in the European Commission's recently communicated targeted approach to online platforms (European Commission, 2016a, 2016d).

Many of the characteristics of digital platforms and their potential impact on public interests are known from other contexts. In those contexts, instruments have already been set in place. It is the law makers' and supervisory authorities' challenge to update and interpret the available instruments in order to better promote efficiencies and innovations offered by digital platforms and to better protect public interests. At the same time, there is substantial scope for optimizing the applicability and enforcement of existing instruments, based on a more—often existing—normative perspective. This removes the need to put new instruments in place, which is often a lengthy and cumbersome process. However, it requires a substantial commitment to interpret existing instruments and focus on effective normative methodologies for application and enforcement, such as more risk/harm-centered approaches.

**Pieter Nooren, Ph.D.**, Senior Scientist, TNO, The Hague, the Netherlands.

**Nicolai van Gorp, M.A.**, Director, e-Conomics, Rotterdam, Zuid-Holland, the Netherlands.

**Nico van Eijk, Ph.D.**, Professor of Media and Telecommunications Law and Director of the Institute for Information Law, Faculty of Law, University of Amsterdam, Amsterdam, the Netherlands.

**Ronan Ó Fathaigh, LL.M.**, Researcher, Institute for Information Law, Faculty of Law, University of Amsterdam, Amsterdam, the Netherlands [r.f.fahy@uva.nl].

## Notes

1. Thuisafgehaald is a Dutch sharing economy platform for sharing of home-cooked meals. The platform links cooks to people looking for a meal and vice versa. The platform operates in a number of countries and languages.
2. The cases studies have served to validate and refine the analytical framework, in particular how it captures the platform characteristics and public interests. The goal was not to evaluate whether there is a need for more (or less) government intervention in the specific cases.
3. An additional transaction fee is charged from the retailer when the retailer makes use of so-called "fulfillment by Amazon" and stores its products in Amazon's fulfillment centers until they are sold via the market place. In addition, Amazon offers consumers a subscription to Prime (for a subscription fee) which includes free shipment of products, free access to video content, games, and books, as well as free cloud storage.
4. Netflix's users benefit somewhat when the number of users grows because this may contribute to an improved quality of Netflix's recommendations, and additional content; as such, this does represent a limited direct network effect.

5. In parallel to the work by Rochet and Tirole (2003, 2006) on platform competition in two-sided markets, Caillaud and Jullien (2003), Evans (2003), and Armstrong (2006) were also highly influential for the understanding of how digital two-sided markets function.
6. Van Gorp and Batura (2015) make the analogy with a platform in the car industry, which is a technological basis on which several models of cars can be built.
7. Note that Netflix explicitly rules out using an advertising business model in its strategy (<https://ir.netflix.com/long-term-view.cfm>), making this example unlikely to materialize for now.
8. Rogers (2016) explains that the most common strategy is to first focus on that user group which attracts most other user groups (referred to by Rogers as the King of the platform). In Amazon's case, consumers are the stated King of the Platform.
9. The European Commission distinguishes between "Market places and e-commerce platforms" which are basically transaction platforms; "Social media and content platforms" which are basically communication platforms; "Mobile ecosystems and application distribution platforms" which are basically innovation platforms combined with a transaction platform forming a platform of platforms; and "Internet Search services" where one may argue that Internet search services are a content platform as well, given it intermediates between websites offering content and those who seek it.
10. In the absence of market power, firms have much more to gain from innovation in order to "escape" competition (Arrow, 1962). However, Tirole (1992, p. 390) states that "monopoly situations are natural breeding grounds for R&D and if one wants to induce firms to undertake R&D one must accept the creation of monopolies as a necessary evil." Aghion, Bloom, Blundell, Griffith, and Howitt argue (2005) that the relationship between product market competition and innovation resembles an inverted U-shape, an idea they support with empirical analysis.
11. This is analogous to efficiency gains related to a so-called "natural monopoly" resulting from the classical economies of scale. However, this also involves the above-mentioned risks associated with market power.
12. To illustrate, Google makes money by making the Internet searchable and it is the uncontested leading search engine in Europe. However, since people started spending 30 percent of their time on Facebook and 30 percent of their time using apps on an iPhone, this meant that 60 percent of the content on the Internet could not be found by Google's search engine and hence Google had to react with its own smartphone and its own social network, or lose advertisement revenues.
13. Van Til et al. (2017, pp. 12–13) show that the risk of such a scenario depends on five factors: (1) Are the data exclusively available to one company or can other companies obtain access as well? (2) Does the use of data contribute to learning effects that can be used to improve the product or service? (3) Are data used for the orchestration of interaction on a network? (4) Are there any assets that can be considered complementary to the data, and are there exclusive or substitutable assets available? And (5) Are there any companies that use a different business model but that compete with the company considered? According to Van Til et al. (2017, pp. 12–13) "The five factors can be applied in both 'data' and 'big data' use cases. The big data revolution has increased the relevancy of combining various data sets (factor 4). The benefits of combining multiple data sets further increase if large amounts of data are needed to improve a product or service (factor 2). Big data have also contributed to the rise of digital platforms, which facilitate interactions between users based on data (factor 3). The biggest potential risk of the use of data for competition can be found in markets in which companies have access to a large volume and variety of data and use it to orchestrate network effects. However, even the market power of such companies can be constrained by competitive threat from existing or new alternative business models (factor 5)."
14. Van Til et al. (2017, p. 50) state that "It is not clear for example how a company with a search engine product could share data in a way that is useful to competitors and also complies with all the rules regarding privacy and data protection. Moreover there is a considerable risk that it results in diminished incentives to innovate for. If ex-ante regulation is used to counter market failures there is a risk that due to 'government failure' consumers are worse off."
15. This does not necessarily mean that the platform should be subjected to the same regulation. It may also mean that regulation may be lifted for all parties. This depends on whether the platform's governance system (e.g., its review system) does a better (more efficient) job than enforcement of food safety regulation by government officials. It may make sense not to subject the platform to rigid and expensive enforcement of food safety regulation such that other restaurants be stimulated to participate in similar platform-based governance structures and food safety regulation may be lifted entirely.

16. Facebook, "Products," <http://newsroom.fb.com/products/>.
17. Facebook, "Facebook to Acquire WhatsApp," February 19, 2014, <http://newsroom.fb.com/news/2014/02/Facebook-to-acquire-WhatsApp>.
18. Facebook, "Facebook to Acquire Oculus," March 25, 2014, <http://newsroom.fb.com/news/2014/03/Facebook-to-acquire-oculus/>.
19. Derived from data in Facebook Q1 2018 Earnings.
20. Facebook, "internet.org by facebook," <http://internet.org>.
21. Facebook, "Community Standards," <https://www.facebook.com/communitystandards>.

## References

- Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt. 2005. "Competition and Innovation: An Inverted-U Relationship." *Quarterly Journal of Economics* 120 (2): 701–28.
- Allen, J., and N. Flores. 2013. "The Role of Government in the Internet." Analysis Mason Final report for the Dutch Ministry of Economic Affairs. Ref: 35894-162. <http://www.analysysmason.com/contentassets/30073e19ff7a4650b2180774425df60c/analysys-mason-report-for-ministry-of-economic-affairs-230413.pdf>.
- Aloisi, A. 2016. "Commoditized Workers: Case Study Research on Labor Law Issues Arising From a Set of 'On-Demand/Gig Economy' Platforms." *Comparative Labor Law & Policy Journal* 37 (3): 653–90.
- Andersson Schwarz, J. 2017. "Platform Logic: An Interdisciplinary Approach to the Platform-Based Economy." *Policy & Internet* 9 (4): 374–94.
- Armstrong, M. 2006. "Competition in Two-Sided Markets." *Rand Journal of Economics* 37 (3): 668–91.
- Arrow, K. 1962. "Economic Welfare and the Allocation of Resources for Invention." In *The Rate and Direction of Inventive Activity*, ed. R. Nelson. NJ: Princeton University Press, 609–25.
- Autorité de la Concurrence and Bundeskartellamt. 2016. "Competition Law and Data." May 10. <http://www.autoritedelaconcurrence.fr/doc/reportcompetitionlawanddatafinal.pdf>.
- Batura, O., N. Van Gorp, and P. Larouche. 2015. "Online Platforms and the EU Digital Single Market: A Response to the Call for Evidence by the House of Lords' Internal Market Sub-Committee." *e-Conomics*. November 23. [http://ec.europa.eu/information\\_society/newsroom/image/document/2016-7/nikolai\\_van\\_gorp\\_-\\_response\\_e-conomics\\_to\\_the\\_uk\\_house\\_of\\_lords\\_call\\_for\\_evidence\\_14020.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2016-7/nikolai_van_gorp_-_response_e-conomics_to_the_uk_house_of_lords_call_for_evidence_14020.pdf).
- Bundeskartellamt. 2016. "Arbeitspapier—Marktmacht von Plattformen und Netzwerken." Bonn: BKartA, B6-113/15. [https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Think-Tank-Bericht.pdf?\\_\\_blob=publicationFile&v=2](https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Think-Tank-Bericht.pdf?__blob=publicationFile&v=2).
- Caillaud, B., and B. Jullien. 2003. "Chicken and Egg: Competition Among Intermediation Service Providers." *Rand Journal of Economics* 34: 309–28.
- Casilli, A.A. 2017a. "Digital Labor Studies Go Global: Toward a Digital Decolonial Turn." *International Journal of Communication* 11 (Special Section "Global Digital Culture"): 3934–54.
- Casilli, A.A. 2017b. "How Venture Labor Sheds Light on the Digital Platform Economy." *International Journal of Communication* 11 (1): 2067–70.
- Choudary, S.P. 2015. *Platform Scale: How an Emerging Business Model Helps Startups Build Large Empires With Minimum Investment*. Platform Thinking Labs. [https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Think-Tank-Bericht.pdf?\\_\\_blob=publicationFile&v=2](https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Think-Tank-Bericht.pdf?__blob=publicationFile&v=2).
- Council Directive. 2000a, 27 November. *Establishing a General Framework for Equal Treatment in Employment and Occupation*. (2000/78/EC). *Official Journal L* 303/16. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32000L0078>.
- Council Directive. 2000b, 29 June. *Implementing the Principle of Equal Treatment Between Persons Irrespective of Racial or Ethnic Origin*. (2000/43/EC). *Official Journal L* 180/22. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32000L0043>.
- Council Directive. 2009, 12 June. *Introduction of Measures to Encourage Improvements in the Safety and Health of Workers at Work*. (89/391/EEC). *Official Journal L* 183/1. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:31989L0391>.

- De Streel, A. 2016. "Competition in the Digital Economy." Paper presented at the CEPS/e-Economics Seminar Competition Policy in the Digital Economy: Towards a New Theory of Harm, June 1, Brussels.
- Dutch Data Protection Authority. 2013. *Canadian and Dutch Data Privacy Guardians Release Findings From Investigation of Popular Mobile App*. January 28. <https://cbpweb.nl/en/news/canadian-and-dutch-data-privacy-guardians-release-findings-investigation-popular-mobile-app>.
- Dutch Ministry of Economic Affairs. 2014. *Vision on Telecommunications, Media and Internet: The Next Steps*. The Hague. December 23. <https://www.government.nl/documents/reports/2014/02/07/vision-on-telecommunications-media-and-internet-the-next-steps>.
- Elvy, S.-A. 2017. "Paying for Privacy and the Personal Data Economy." *Columbia Law Review* 117 (6): 1369–459.
- EU Court of Justice. 2014, 13 May. *Google Spain SL v Agencia Española de Protección de Datos* (Case C-131/12). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62012CJ0131>.
- EU Court of Justice. 2017, 20 December. *Asociación Profesional Élite Taxi v Uber Systems Spain SL. Judgment of the Court (Grand Chamber)* (Case C-434/15). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62015CJ0434>.
- EU Court of Justice. 2018, 10 April. *Uber France SAS v Nabil Bensalem. Judgment of the Court (Grand Chamber)* (Case C-320/16). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62016CJ0320>.
- European Commission. 2001. "European Governance—A White Paper." COM(2001) 428 final. *Official Journal of the European Communities* C 287/1. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52001DC0428>.
- European Commission. 2015a. "Antitrust: Commission Launches e-Commerce Sector Inquiry." Press Release IP/15/4921. May 6. [http://europa.eu/rapid/press-release\\_IP-15-4921\\_en.htm](http://europa.eu/rapid/press-release_IP-15-4921_en.htm).
- European Commission. 2015b. *A Digital Single Market Strategy for Europe*. COM(2015) 192 Final. May 6. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52015DC0192>.
- European Commission. 2015c. *Public Consultation on the Regulatory Environment for Platforms, Online Intermediaries, Data and Cloud Computing and the Collaborative Economy*. September 24. <https://ec.europa.eu/digital-single-market/en/news/public-consultation-regulatory-environment-platforms-online-intermediaries-data-and-cloud>.
- European Commission. 2016a. "Commission Updates EU Audiovisual Rules and Presents Targeted Approach to Online Platforms." Press Release. May 25, Brussels. [http://europa.eu/rapid/press-release\\_IP-16-1873\\_en.htm](http://europa.eu/rapid/press-release_IP-16-1873_en.htm).
- European Commission. 2016b. "Online Platforms." Commission Staff Working Document, COM(2016) 288. [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=15947](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=15947).
- European Commission. 2016c. *Online Platforms and the Digital Single Market—Opportunities and Challenges for Europe*. Brussels: COM(2016) 288 final.
- European Commission. 2016d. "Opening Statement by Vice-President Ansip at the European Parliament on the Decision Adopted on the Digital Single Market Package." May 25. [https://ec.europa.eu/commission/2014-2019/ansip/announcements/opening-statement-vice-president-ansip-european-parliament-decision-adopted-digital-single-market\\_en](https://ec.europa.eu/commission/2014-2019/ansip/announcements/opening-statement-vice-president-ansip-european-parliament-decision-adopted-digital-single-market_en).
- European Parliament and of the Council. 2003, 4 November. *Directive Concerning Certain Aspects of the Organisation of Working Time*. (2003/88/EC). *Official Journal* L 299/9. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32003L0088>.
- European Parliament and of the Council. 2008, 19 November. *Directive on Temporary Agency Work*. (2008/104/EC). *Official Journal* L 327/9. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32008L0104>.
- European Parliament and Council of the European Union. 2000, 8 June. *Directive on Certain Legal Aspects of Information Society Services, in Particular Electronic Commerce, in the Internal Market*. (2000/31/EC). *Official Journal* L 178. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0031>.

- European Parliament and Council of the European Union. 2009, 25 November. *Directive Amending Directive 2002/22/EC on Universal Service and Users' Rights Relating to Electronic Communications Networks and Services, Directive 2002/58/EC Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector.* (2009/136/EC). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0136>.
- European Parliament and Council of the European Union. 2010, 10 March. *Directive on the Coordination of Certain Provisions Laid Down by Law, Regulation or Administrative Action in Member States Concerning the Provision of Audiovisual Media Services.* (2010/13/EU). Official Journal L 9/1. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0013>.
- European Parliament and Council of the European Union. 2011, 25 October. *Directive on Consumer Rights, Amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and Repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council.* (2011/83/EU). Official Journal of the European Union L 304/64. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0083>.
- European Parliament and Council of the European Union. 2016, 27 April. *Regulation on the Protection of Natural Persons With Regard to the Processing of Personal Data and on the Free Movement of Such Data.* (2016/679). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0679>.
- Evans, D.S. 2003. "Some Empirical Aspects of Multi-Sided Platform Industries." *Review of Network Economics* 2 (3): 191–209.
- Evans, D.S., and A. Gawer. 2016. "The Rise of the Platform Enterprise: A Global Survey." *The Emerging Platform Economy Series*, Vol. 1. The Center for Global Enterprise. [https://www.thecge.net/app/uploads/2016/01/PDF-WEB-Platform-Survey\\_01\\_12.pdf](https://www.thecge.net/app/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf).
- Evans, D.S., and R. Schmalensee. 2007. "The Industrial Organization of Markets With Two-Sided Platforms." *Competition Policy International* 3 (1): 151–79.
- Farrell, J., and G. Saloner. 1985. "Standardization, Compatibility, and Innovation." *Rand Journal of Economics* 16 (1): 70–83.
- French Digital Council. 2014. *Opinion no. 2014-2 of the French Digital Council on Platform Neutrality.* [https://cnnumerique.fr/wp-content/uploads/2014/06/PlatformNeutrality\\_VA.pdf](https://cnnumerique.fr/wp-content/uploads/2014/06/PlatformNeutrality_VA.pdf).
- Guibault, L., N. Helberger, B. van der Sloot, M.B.M. Loos, C. Mak, and L. Pessers. 2013. *Digital Consumers and the Law. Towards a Cohesive European Framework.* Alphen aan den Rijn: Kluwer Law International.
- Hagiu, A., and J. Wright. 2015a. "Marketplace or Reseller?" *Management Science* 61 (1): 184–203.
- Hagiu, A., and J. Wright. 2015b. "Multi-Sided Platforms." *International Journal of Industrial Organization* 43: 162–74.
- Helberger, N., K. Kleinen-von Königslöw, and R. van der Noll. 2015. "Regulating the New Information Intermediaries as Gatekeepers of Information Diversity." *Info* 17 (6): 50–71.
- House of Lords. 2016. *Online Platforms and the Digital Single Market, Select Committee on European Union.* Select Committee on European Union: 10th Report of Session 2015–16. April 20. <https://publications.parliament.uk/pa/ld201516/ldselect/ldselect/129/129.pdf>.
- Katz, M., and C. Shapiro. 1985. "Network Externalities, Competition, and Compatibility." *American Economic Review* 75 (3): 424–40.
- Kenney, M., and J. Zysman. 2016. "The Rise of the Platform Economy." *Issues in Science and Technology* 32 (3): 61–9.
- Knapp, D. 2016. "The Logic of Data & the Structural Transformation of Media: A Practical Perspective." Paper presented at the CEPS/e-Conomics Seminar Competition Policy in the Digital Economy: Towards a New Theory of Harm, June 1, Brussels.
- Martens, B. 2016. "An Economic Policy Perspective on Online Platforms." Institute for Prospective Technological Studies Digital Economy Working Paper 2016/05, JRC101501.
- Monopolkommission. 2015. *Special Report 68: Competition Policy: The Challenge of Digital Markets.* June 1. <http://www.monopolkommission.de/index.php/en/reports/special-reports/284-special-report-68>.
- Nash N., J. Bright, H. Margetts, and V. Lehdonvirta. 2017. "Public Policy in the Platform Society." *Policy & Internet* 9 (4): 368–73.

- Nooren, P., W. Koers, M. Bangma, F. Berkers, and E. Boertjes. 2014. "Regulation in the Converged Media-Internet-Telecom Value Web." TNO Report R11428. <http://publications.tno.nl/publication/34611843/Nhocfj/TNO-2014-R11482.pdf>.
- Parker, G.G., M.W. Van Alstyne, and S.P. Choudary. 2016. *Platform Revolution: How Networked Markets Are Transforming the Economy—And How to Make Them Work for You*. New York: W. W. Norton & Company.
- Peitz, M. and T. Valletti. 2015. "Reassessing Competition Concerns in Electronic Communications Markets." *Telecommunications Policy* 39: 896–912.
- Posner, R. 1974. "Theories of Economic Regulation." *The Bell Journal of Economics and Management Science* 5 (2): 335–58.
- Prassl, J., and M. Risak. 2016. "Uber, Taskrabbit, and Co.: Platforms as Employers? Rethinking the Legal Analysis of Crowdwork." *Comparative Labor Law & Policy Journal* 37 (3): 619–52.
- Prüfer, J., and C. Schottmüller. 2016. "Competing With Big Data." Paper presented at the 20th Annual Conference of the Society for Institutional & Organizational Economics, June 15–17, Paris.
- Rochet, J.-C., and J. Tirole. 2003. "Platform Competition in Two-Sided Markets." *Journal of the European Economic Association* 1: 990–1029.
- Rochet, J.-C., and J. Tirole. 2006. "Two-Sided Markets: A Progress Report." *Rand Journal of Economics* 35: 645–67.
- Rogers, D.L. 2016. *The Digital Transformation Playbook: Rethink Your Business for the Digital Age*. New York: Columbia University Press.
- Rohlfs, J. 1974. "A Theory of Interdependent Demand for a Communications Service." *Bell Journal of Economics* 5 (1): 16–37.
- Rosenblat, A., K.E.C. Levy, S. Barocas, and T. Hwang. 2017. "Discriminating Tastes: Uber's Customer Ratings as Vehicles for Workplace Discrimination." *Policy & Internet* 9 (3): 256–79.
- Schulz, W., and N. van Eijk. 2015. "Study on the Future of European Audiovisual Regulation." Final report of HERMES, Hamburg/Amsterdam. <https://www.ivir.nl/publicaties/download/1643>.
- Tirole, J. 1992. *The Theory of Industrial Organization*. Cambridge: MIT Press.
- Van Eijk, N., R. Fahy, H. van Til, P. Nooren, H. Stokking, and H. Gelever. 2015. "Digital Platforms: An Analytical Framework for Identifying and Evaluating Policy Options." TNO report R11271. November 9. <https://www.rijksoverheid.nl/documenten/rapporten/2015/11/09/digital-platforms-an-analytical-framework-for-identifying-and-evaluating-policy-options>.
- Van Eijk, N., C.J. Hoofnagle, and E. Kannekens. 2017. "Unfair Commercial Practices: A Complementary Approach to Privacy Protection." *European Data Protection Law Review* 3: 1–12.
- Van Gorp, N., and O. Batura. 2015. *Challenges of Competition Policy in a Digitalised Economy*. European Parliament. IP/A/ECON/2014-12. [http://www.europarl.europa.eu/RegData/etudes/STUD/2015/542235/IPOL\\_STU%282015%29542235\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/542235/IPOL_STU%282015%29542235_EN.pdf).
- Van Gorp, N., F. van Doorn, and M. Canoy. 2008. *Leveringsvoorwaarden Internetwinkels*. Ecorys Study for the Dutch Competition Authority. December 4. <https://www.acm.nl/nl/download/bijlage/?id=7801>.
- Van Til, H., N. Van Gorp, & K. Price. 2017. "Big Data and Competition." Ecorys Study for the Dutch Ministry of Economic Affairs, Ecorys, Rotterdam. <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2017/06/13/big-data-and-competition/big-data-and-competition.pdf>.
- Zuiderveen Borgesius, F.J. 2015. *Improving Privacy Protection in the Area of Behavioural Targeting*. Alphen aan den Rijn: Kluwer Law International.