What Is the Value of Users, Anyway? How to Value The User Contribution to Digital Enterprises

by Vladimir Starkov and Oceana Wang

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The views expressed in this article are solely those of the authors and do not necessarily represent those of NERA Economic Consulting. The authors would like to thank Harlow Higinbotham for review and comments. Any remaining errors and omissions are the authors' own.

In this article, the authors consider the economics of digital businesses and the value of user contribution, including through active engagement and the provision of data, to those entities. After considering several options, they propose a framework for estimating the taxable value that users in market countries bring to digital platforms based elsewhere.

Tax authorities around the world are diligently working to develop concepts and methods that will pave the way for levying new types of taxes on companies with digitalized consumer-facing business models.[1] Conceptually, these new taxes are meant to capture the value of user engagement and data collection activities in jurisdictions where the digital enterprises have no (or minimal) physical presence. While the search for solutions for taxation of the digital economy is underway — and mainly occurring in the political realm — this article addresses the issue of user-created value from an economic perspective.

As the OECD explained in the documents it issued in the course of its work on stemming tax avoidance in the digital economy,[2] the motivation for imposing new taxes on digital businesses in the countries where their users are located stems from the observation that — despite the fact that digital businesses may lack significant or, indeed, any physical presence in some countries — these countries (often referred to as market countries) may still have sizeable user populations that are actively engaged with the online platforms that the multinational businesses operate. The OECD and many of the members of the inclusive framework[3] contend that the economic activities of users in market countries create value for the businesses that operate the digital platforms. At the same time, many believe the existing rules of taxation are inadequate to allow market countries to tax the value created by the users located in these countries.

While the OECD secretariat is trying to build consensus around the newly drafted "unified approach," 16 countries have, at the time of this writing, already implemented unilateral taxation measures through their domestic laws, and seven others were in various stages of the implementation process.

There are some common features shared by various digital business models. All of them employ sophisticated and often proprietary technology. Most models rely on networks of users to whom they may grant either paid or free

[1] While the OECD secretariat's "unified approach" proposal expands the proposed taxing rights to all "consumer-facing businesses," this article will focus on business models that rely on digital networks. *See* OECD, "Secretariat Proposal for a 'Unified Approach' Under Pillar One — Public Consultation Document" (Oct. 2019).

[2] *See, e.g.*, OECD, "Tax Challenges Arising From Digitalisation — Interim Report 2018" (Mar. 16, 2018); and OECD, "Addressing the Tax Challenges of the Digitalization of the Economy — Public Consultation Document" (Feb. 2019).

[3] Formed in 2016 and including approximately 130 countries to date, the inclusive framework focuses on developing measures to combat tax planning strategies that allegedly result in base erosion and profit shifting by multinational companies and monitoring the progress of these initiatives. Although most of the inclusive framework members are not OECD members, the OECD coordinates the group's work.

access to their digital platform. Often, digital business models develop a network of advertisers and unrelated content providers (the latter may be the platform users themselves). Digital businesses also tend to collect extensive data related to activities of their users to improve the functioning of their platforms, increase user engagement, and gain revenues from advertising. Businesses built around digital platforms often centralize many functions in one or a few locations to reduce costs and improve efficiency. This centralization allows digital businesses to operate remotely in other geographical areas without establishing a physical presence there (such as an office or a warehouse).

Yet despite these similarities, digital businesses employ a wide variety of business models that are distinct in part because of the types of intangibles that are important to each entity. Examples of common digital business models include the online sales of products, content, or services; multi-sided e-commerce platforms; and social networks. Each of these business models may utilize network effects (a concept that is explained in the next section) and user data differently. The forms of user engagement may also vary significantly from one platform to the next, with examples ranging from the consumption of goods, services, and content (such as online shopping or the streaming of music or videos) to engaging in transactions with other platform users (for example, ride hailing or property rental) to social interactions to participation in the so-called sharing economy. For digital businesses, user-created value is intrinsically linked to the nature of the business itself. The importance of factors such as, *inter alia*, the network effect, the data collected from users, and the way the user data is processed is highly dependent on the type of business model.

Digital businesses engage in numerous internal activities to create value within the enterprise — for example, platform development, platform security, data collection and analytics, the creation and improvement of user experiences, the development of customer relationships, and regular maintenance of physical infrastructure. Some, if not most, of these internal activities focus on maintaining or growing the network and utilizing the user data to the best possible effect. Given the profound connection between the internal activities of a digital enterprise and users' contributions to the network effect and generation of data, an analysis of the user contribution has to be a part of the analysis that encompasses all value-creating activities performed within the digital businesses with which these users interact.

If the value chain analysis[4] establishes that user contribution, as a category of value added, plays a significant role in a given business model — possible candidates include platforms that rely extensively on user-generated content or interaction among users — it may be appropriate or even necessary to consider user contribution as one of the factors on which a consolidated global residual profit for the relevant business will be split. Designed around the value chain analysis and the market evidence, this method can be applied to any industry without ring-fencing any particular subset of business models.

This article presents a conceptual framework that can be used to estimate the value of user contribution. We expect that the value of user contributions will vary significantly from one business model to another. However, empirical estimations of the value of user contribution, which require market data and internal data from digital firms, are outside the scope of this article.

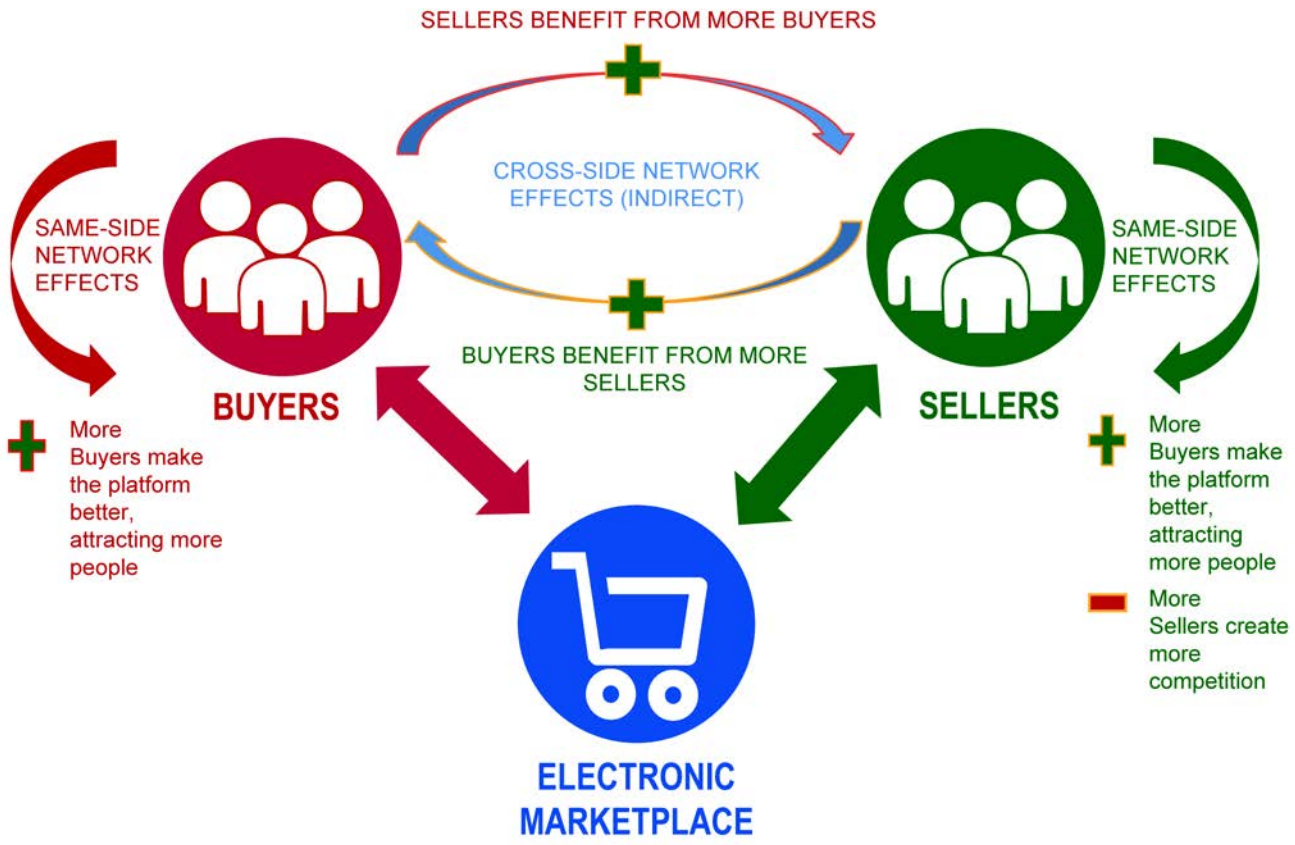
A Brief Primer on Network Economics

The Network Effect

A large majority of digital firms employ business models that rely on contacts with many parties. These parties may include advertisers, sellers, content providers, and users who may or may not pay to access the digital platform. The multitude of parties with which a firm interacts can be viewed as a network. Networks are not a phenomenon exclusive to digital business models. In fact, networks exist in well-established industries such as credit cards,

[4]Several publications have described value chain analysis, including: Yves Herve and Vladimir Starkov, "Q&A: Transfer Pricing Value Chains and Supply Chains Post-BEPS," *Financier Worldwide Mag.* (Nov. 2019); Pim Fris, Sébastien Gonnet, and Ralph Meghames, "Understanding Risk in the Enterprise: The Key to Transfer Pricing for Today's Business Models," 21(6) *Int'l Transfer Pricing J.* (Nov./Dec. 2014); and NERA Economic Consulting, *Value Creation, Comparability and Bargaining Analysis: Key References in Transfer Pricing Going Forward* (May 2014).

Figure 1. Network Effects



Source: Adapted from YSH, "eBay — The Perfect Store(y) of Network Effects," Harvard Business School Digital Initiative blog, Oct. 4, 2015.

telecommunications, and TV and radio broadcasting. Networks also exist as part of various social and business clubs and organizations.

Because networks are not a new phenomenon, they have been studied before. Economists have described several distinct phenomena that take place in firms with business models that rely on networks. For instance, economists have defined the network effect — or network externalities — as "the circumstance in which the net value of an action (consuming a good, subscribing to telephone service) is affected by the number of agents taking equivalent actions."[5] A positive direct network effect" raise[s] the value received by consumers as markets get larger" while a negative network effect occurs when individual users' utility is negatively affected by the increasing number of other users on the platform.[6] Networks that have both buyers and sellers — that is, double-sided networks — may exhibit "same-side" effects and "cross-side" effects.[7] Figure 1 illustrates these effects.

Economists have also described the reasons why double-sided networks may apply zero pricing for some categories of users. This occurs because double-sided platforms can offset losses incurred on one side of the platform with the profits earned on the other side of the platform

[5] S.J. Liebowitz and Stephen E. Margolis, "Network Externality: An Uncommon Tragedy," 8(2) *J. of Econ. Persp.* 133 (1994).

[6] Liebowitz and Margolis, "Network Externalities (Effects)," The University of Texas at Dallas (accessed Nov. 20, 2019).

[7] Andrei Hagiu and Julian Wright, "Multi-Sided Platforms," 43(C) *Int'l J. of Indus. Org.* 162 (2015).

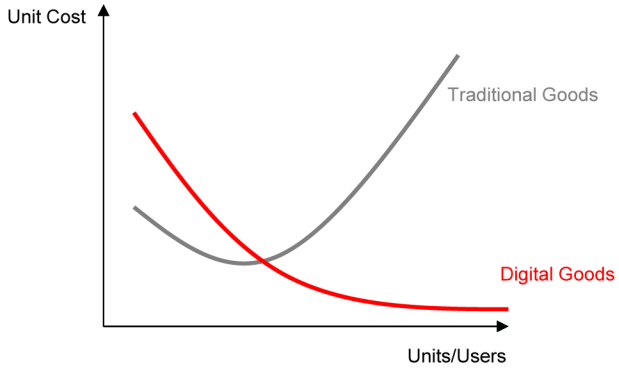
(for example, offsetting free user access with fees paid by sellers or advertisers).[8]

Traditional Businesses Versus Digital Businesses

Despite some parallels between the networks of the pre-digital age and the networks of the digital economy, there are some aspects of digital networks that make them different from legacy networks. To demonstrate these differences, consider the marginal costs and marginal revenues for both a firm with a digital network and a traditional firm.

The marginal cost is the increase (or decrease) in unit cost caused by producing one more unit of a particular good. For traditional (non-digital) goods, the marginal cost curve is typically U-shaped. In contrast, the marginal cost for digital goods decreases over a broad range of output (or users). Both marginal cost curves are shown in Figure 2.

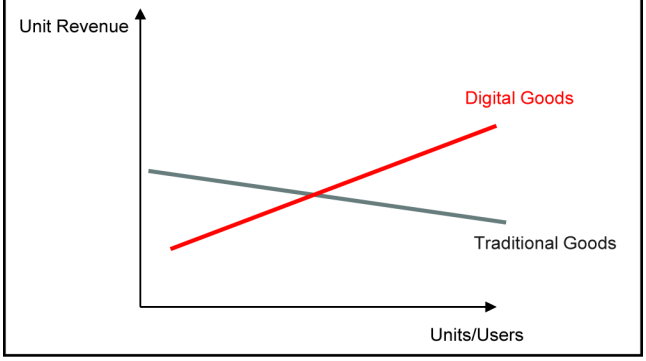
Figure 2. Marginal Cost Curves for Traditional and Digital Businesses



The shape of a marginal revenue curve reflects the degree of market power exercised by a firm. For a firm in a perfectly competitive market, the marginal revenue curve is a horizontal — that is, perfectly elastic — line. For a monopoly, oligopoly, or monopolistically competitive firm, the marginal revenue curve is negatively sloped. Successful digital businesses can exploit the positive network effect in accordance with which revenue per customer grows as the size of the network grows. In contrast, a negative network effect would result in declining revenue per customer as the network grows. For digital companies with a positive network effect, the marginal revenue curve is positively sloped.

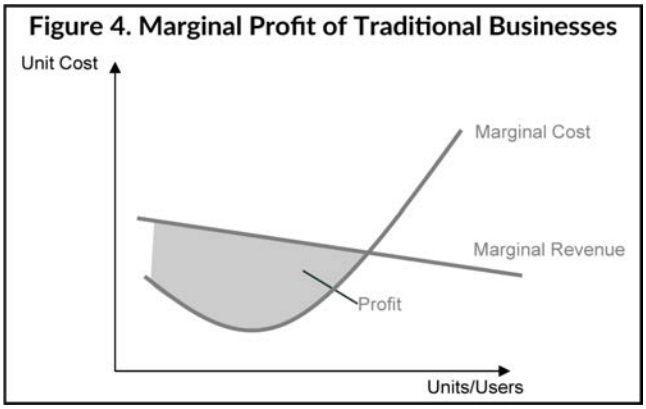
The marginal revenue curves of the "traditional" monopolistically competitive firm and a firm with a positive network effect are depicted in Figure 3.

Figure 3. Marginal Revenue Curves for Traditional and Digital Businesses



Businesses with operations that primarily involve physical goods have marginal costs that increase past a certain level and marginal revenue that declines with output. Therefore, as their output (or number of customers) grows, their marginal profits will decline and eventually turn negative, limiting the output as shown in Figure 4.

Figure 4. Marginal Profit of Traditional Businesses

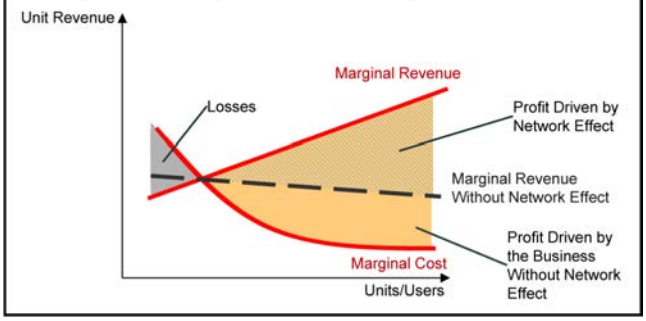


Digital firms will typically experience declining marginal costs as the output (or number of users) grows. Digital firms with a positive network effect will also experience increasing marginal revenue as the network expands because of the increased yield per user. Assuming

[8] Geoffrey Parker and Marshall W. Van Alstyne, "Information Complements, Substitutes, and Strategic Product Design," International Conference on Information Systems Paper (2000).

declining marginal costs and a positive network effect, a digital firm's marginal profit will continue to grow over a much broader range of output (as measured by the network size, for example) than a business that deals mainly with physical goods. A portion of this marginal profit can be attributed to the network effect. Theoretically, the contribution of the network effect to profit can be determined — it is the excess of the profit earned over the profit that would have been earned in the absence of the network effect, as shown in Figure 5.

Figure 5. Marginal Profit of Digital Businesses



The Role of User Contribution to Networks

The User Input

Different networks have been created for different purposes, and as such they often have different designs. Some networks, for instance, are designed primarily for interactions between the firm and the users, while other networks are designed to facilitate and encourage interactions among the users themselves.

The degree of user interaction with a business can be measured along the following dimensions:

- users' ability to provide an input to the business;
- users' ability to discover other users; and
- users' ability to interact with other users.

For instance, credit card networks provide limited opportunities for user input in all three dimensions, while clubs and organizations provide broad opportunities for user input in all dimensions. Similarly, the networks that digital firms build may allow for different degrees of user interaction, from limited user input (for example, user reviews or comments) to active contribution of content by users (for example, online marketplaces and social networks).

Distinction Between Customers and Users

Digital businesses may have customers who are distinct from users, although the degree of differentiation varies across business models. For online providers of goods and services, customers tend to be the same as end-users. For social networks or search engines, customers are advertisers who are distinct from the users who are targeted by the advertisements.

Notably, the differentiation between customers and users also exists in networks that firms created before the digital era. In telephone networks, the customers are the end-users. In broadcast TV and radio networks, the customers are advertisers and users receive advertiser-sponsored content for free.

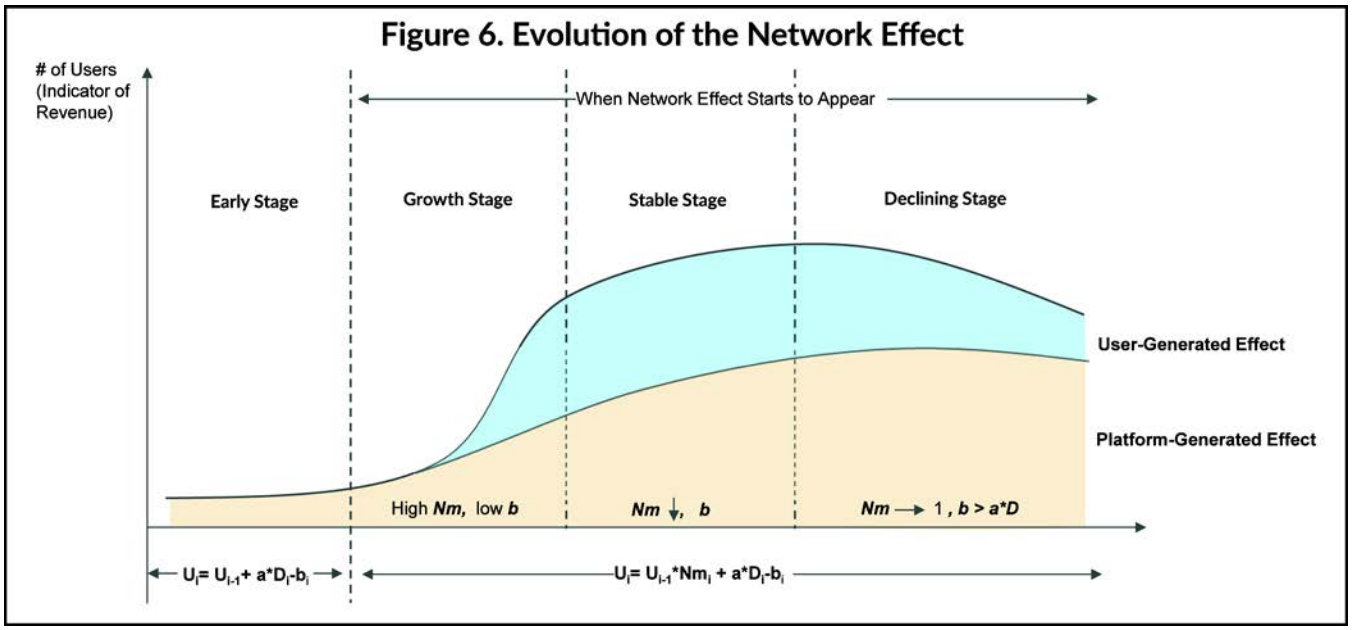
Contributions to the Network Effect

While the degree of active user participation in a business model varies from one model to another, much of the growth in a given network is a result of the efforts of the business itself. Among other things, the business chooses a business model, selects criteria for participation in the network, attracts participants, gathers and analyzes user data, performs customer-facing activities (for example, sales), and ensures that the network and business itself remain operable.

Although firms' efforts to maintain and expand the network are tightly intertwined with the activities of their users, the users' contributions to the network are more limited. Most networks encourage users to provide content whether that content is relatively limited — like reviews — or more extensive, like the user-supplied content on social networks and other content-driven platforms. Some users, called influencers, play a role in attracting other users with the content they post. Also, when a network suddenly gains popularity and expands rapidly, the incumbent users may help attract new users.

In light of the significant differences among digital business models, not all types of networks experience strong user contribution effects.

As Figure 6 shows, the impact of user contributions also depends on the network's stage of development. The user contribution effect may



be negligible in the early stage of a network's development, but as the network grows the user contribution effects typically grow too.

In the early stage of development, a digital business typically focuses on developing its platform, building the technology infrastructure, and attracting an initial group of users. At this stage, network growth is mainly driven by the company's own marketing activities.

For each period (i), the number of users (U_i) can be represented as a function of the number of users in the prior period U_{i-1}, the investments in marketing or development activities in the period i (D_i), and user attrition (b_i) (churn rate). The actual number of users attracted by the firm's investments in marketing and platform development can be expressed by applying a factor (a) to the development cost (D_i). Thus, the number of network users during a period sometime in the early stage of the network development can be expressed as:

$$U_i = U_{i-1} + a \times D_i - b_i$$

As the business grows and the user base increases, new users may be attracted to the platform not only because of the firm's marketing activities but also because of the existing users through referrals and word of mouth. This user network multiplier (N_m), which is a result of the existing users' participation in the platform, can be high during the period of rapid growth and may gradually decrease as the business matures and the number of users nears the saturation point. The user attrition rate (b_i) may also increase as the network size reaches a stable or declining stage. Thus, the following equation — which includes an additional element, the user network multiplier (N_m) — describes the number of users in the network during the growing, stable, or declining phases:

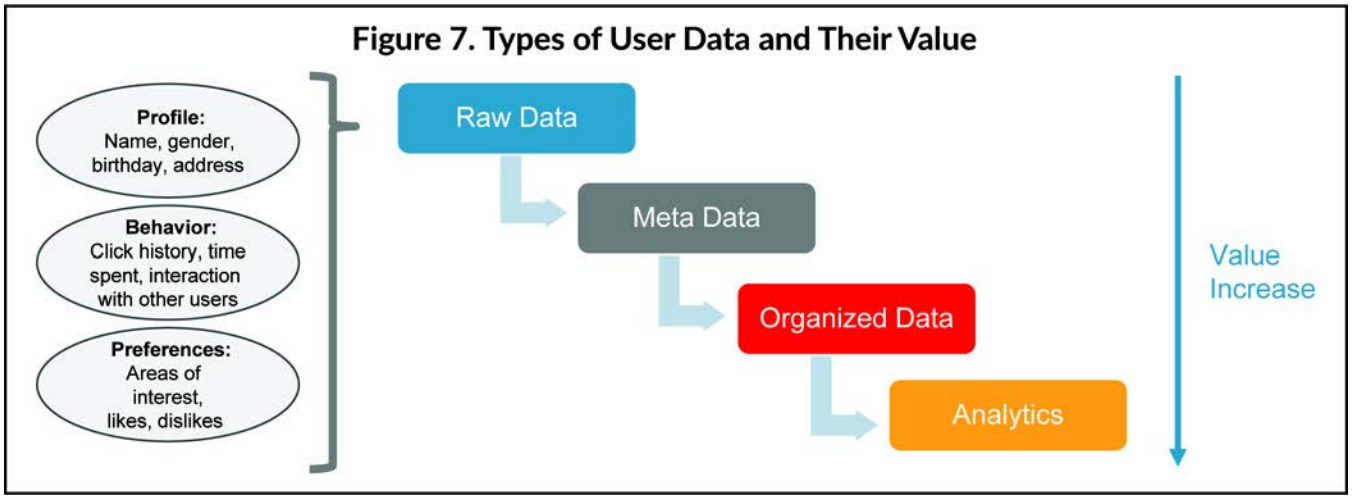
$$U_i = U_{i-1} \times N_{mi} + a \times D_i - b_i$$

The user network multiplier will likely be greater than 1.0 during the network expansion phase. As the network approaches saturation, the size of the network multiplier will begin to approach 1.0. The network multiplier should not decline below 1.0 using this framework since a separate term accounts for user attrition.

It is important to note that network expansion is not only a result of the efforts of incumbent users. The digital business continues to contribute to network expansion through its own efforts including investments in marketing, making improvements to the user's experience, or expanding business offerings.

User Data Generally

The ability to gather various types of detailed data regarding users' activities — for example, content selections, browsing patterns, and shopping choices — distinguishes digital businesses from traditional business models. The ability to gather data brings with it the ability to process and analyze these user data.



The term "user data" often has a broad meaning in discussions related to digital platforms, and it may encompass different types of data of varying value. Digital businesses use data in a range of forms from raw data and metadata to organized data (for example, user identities matched with browsing patterns) and analytics. However, the value of different forms of data varies substantially — increasing from raw data to analytics.

Further, because the ability to analyze and monetize data varies across businesses, the value of data, in general, is different across businesses.

Digital platforms can extract value from user data in several different ways. For example:

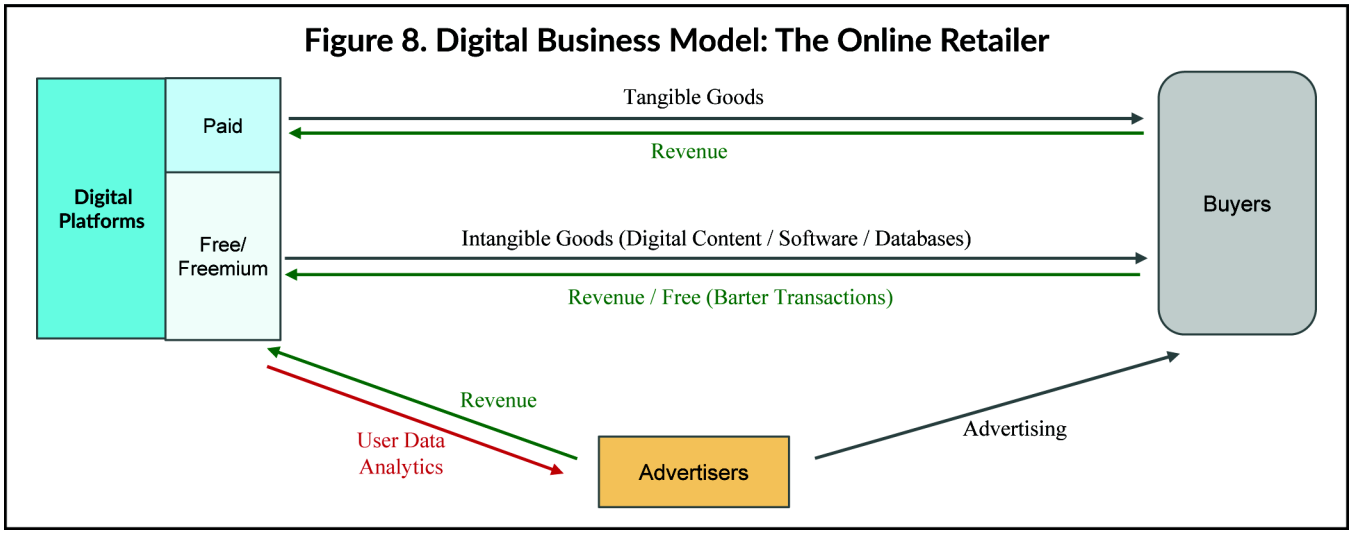
- Platforms that encourage user-provided content benefit from that content because it helps them retain existing users and attract new users to the network.
- Platforms can use analytics derived from user data to offer targeted advertising, which provides a source of revenue for digital businesses.
- Businesses can use information they learn from processing user data to further develop platform algorithms and create new products. This information becomes an additional source of value.

As the preceding discussion and Figure 7 help demonstrate, the term "user data" is quite broad and its usage must include qualifiers to narrow down the type of data at issue.

The Evolving Role of User Data

Digital business models evolve at a rapid pace. In turn, the role played by user data is constantly evolving. Some of the factors that may affect the value of user data in the near future include:

- Some countries are imposing restrictions on the collection, storage, and transfer of personal data. This may reduce the value of individual user data if that data cannot be added to larger samples for analysis.
- The large amount of user data collected by mature digital businesses may result in a saturation effect once digital businesses have created portfolios of typical user profiles. Only a limited amount of user-specific data would then be needed to categorize new users and offer targeted content.
- Firms can now purchase user data (from raw data to organized data) from unrelated providers, an illustration of the fact that the function of data collection and data organization is becoming commoditized.
- The proliferation of internet-connected devices (known as the internet of things) is opening opportunities to collect user data in ways that are not connected to any explicit user actions and may not require user consent. Consider, for example, internet-connected devices in cars and public spaces. The question of whether users themselves have created any value related to this data needs to be answered.



As these examples suggest, it seems unlikely that the value of user data remains static over time. In addition to the general change in value, some types of user data (for example, raw user data) may gain or lose value relative to other types of data (for example, analytics).

Business Models in the Digital Economy

Despite some similarities among them, digital businesses employ a wide variety of business models. The role of user data, the network effect, and user contribution to the network may vary substantially across different digital business models. In this section, we will consider the roles these three factors play in stylized (that is, simplified) examples of three distinct business models: (1) an online retailer (a seller of products, services, or content); (2) a double-sided platform; and (3) a social network.

Figure 8 shows transaction flows for an online retailer.

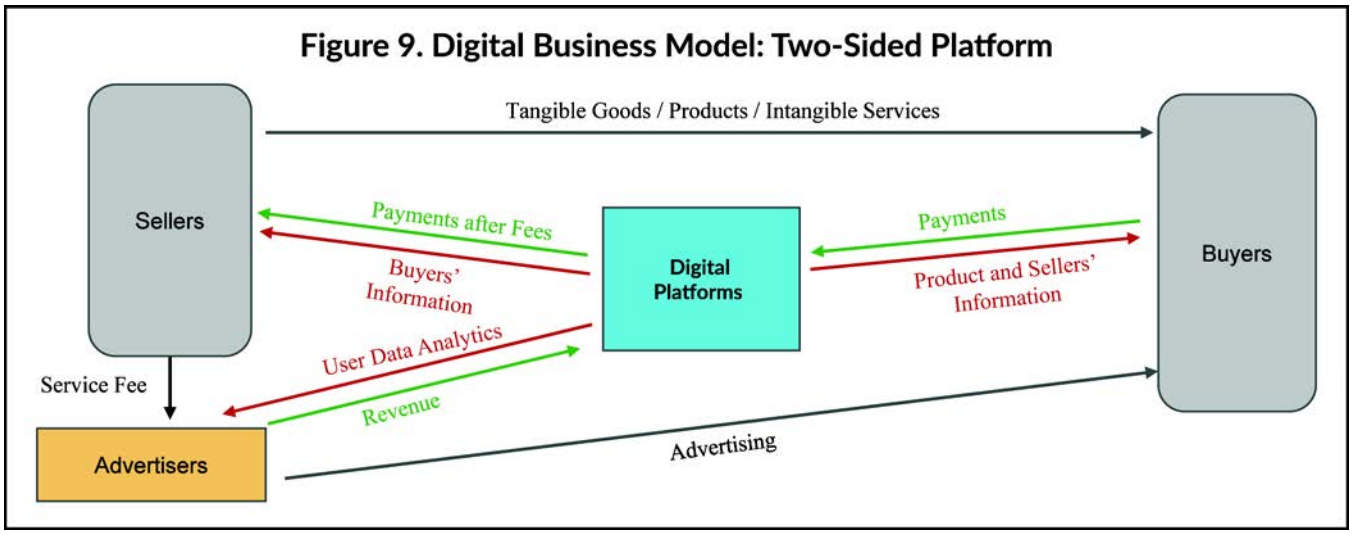
In this business model, the digital company owns the goods, services, or content it sells. While the digital business may earn some revenue from advertisers, advertising revenue is not the main source of revenue for this type of business: Most of the revenue comes from sales to users (or from subscription fees). User contributions to this business primarily consist of purchasing activities, user input (for example, reviews), and contribution of user data. The network effect in this business model is typically one-sided — that is, incumbent users may attract other users.

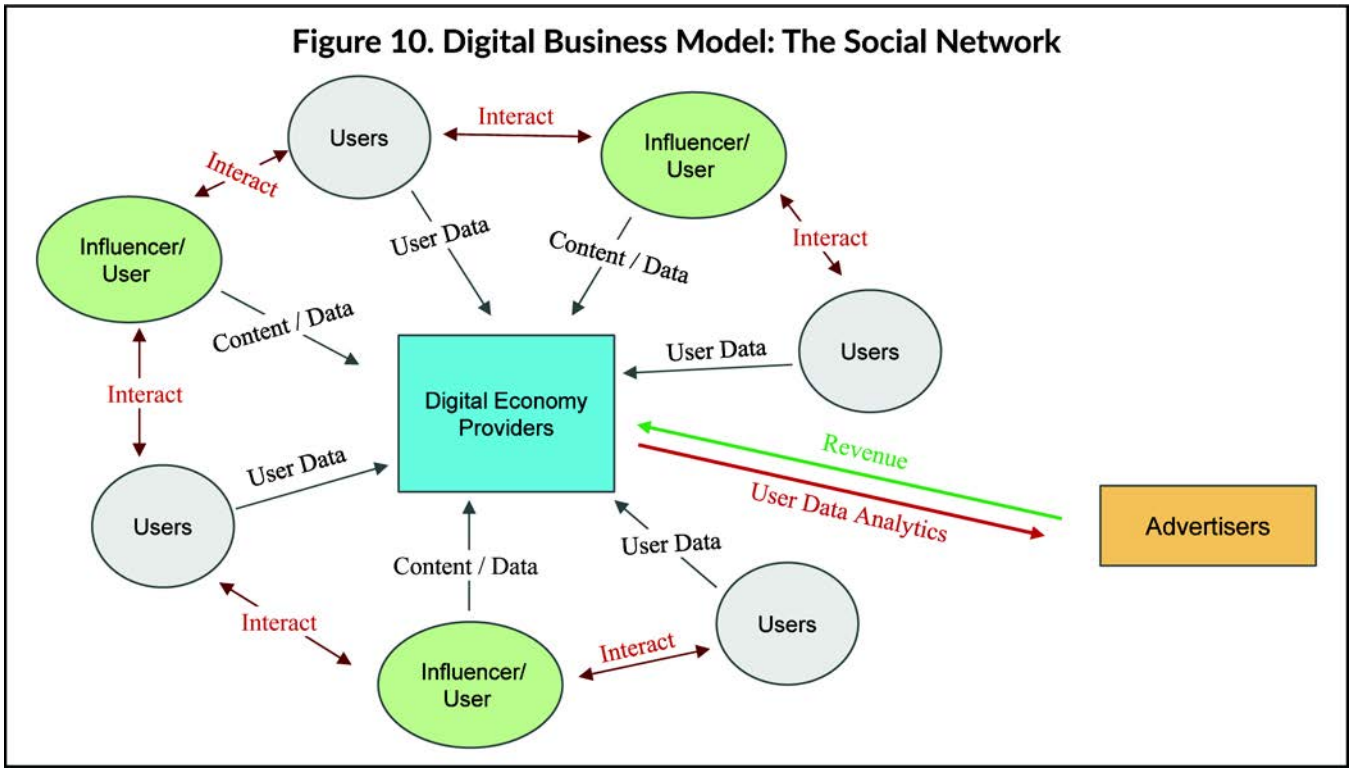
Figure 9 shows transaction flows in a two-sided digital platform.

In the two-sided digital platform, sellers are distinct from the business that operates the platform. The network effect plays an important role in this business model — both same-side and cross-side effects are present. Typically, the advertisers support the sellers and consume the user analytics that the platform provides. The degree of user contribution in the two-sided network may be higher than in the online retailer business model. The user contributions may be manifested through the same-side and cross-side network effects, input into the platform (for example, reviews), and contribution of user data (which are used, in part, to generate advertising revenue).

Figure 10 depicts transaction flows in a social network.

The social network business model often relies on active users (influencers) to attract new users and keep the incumbent users loyal to the platform. Advertising revenue is the key revenue source for this business model, and the platform's key activities include generating analytics from user data in order to sell ads. The advertisement revenue of a social network typically depends on the size of the user network and the precision of its targeted advertisements, which, in turn, depends on the quality of the platform's user data analysis. Thus, the social network model has the highest level of user value contribution among the three business models we have considered here.





Users' Contributions to Value Creation

The success of a digital business — which is typically manifested by large user networks and sometimes by sizeable profits — is rooted in factors such as creating a winning business model and a successful execution strategy. Both of those factors are multifaceted. A successful business model will include a platform that is attractive both to users and customers and offers an effective plan for monetizing user data. Strategy execution may include, for example, continuously fine-tuning the platform design, successfully implementing the monetization model, carefully growing and maintaining the networks of users and customers, cultivating relations with partners, and ensuring the platform operates smoothly.

Therefore, users' contributions to digital business models should be considered in light of contributions that the digital businesses themselves — or, more precisely, their employees, managers, and investors — make to the platform that the users utilize.

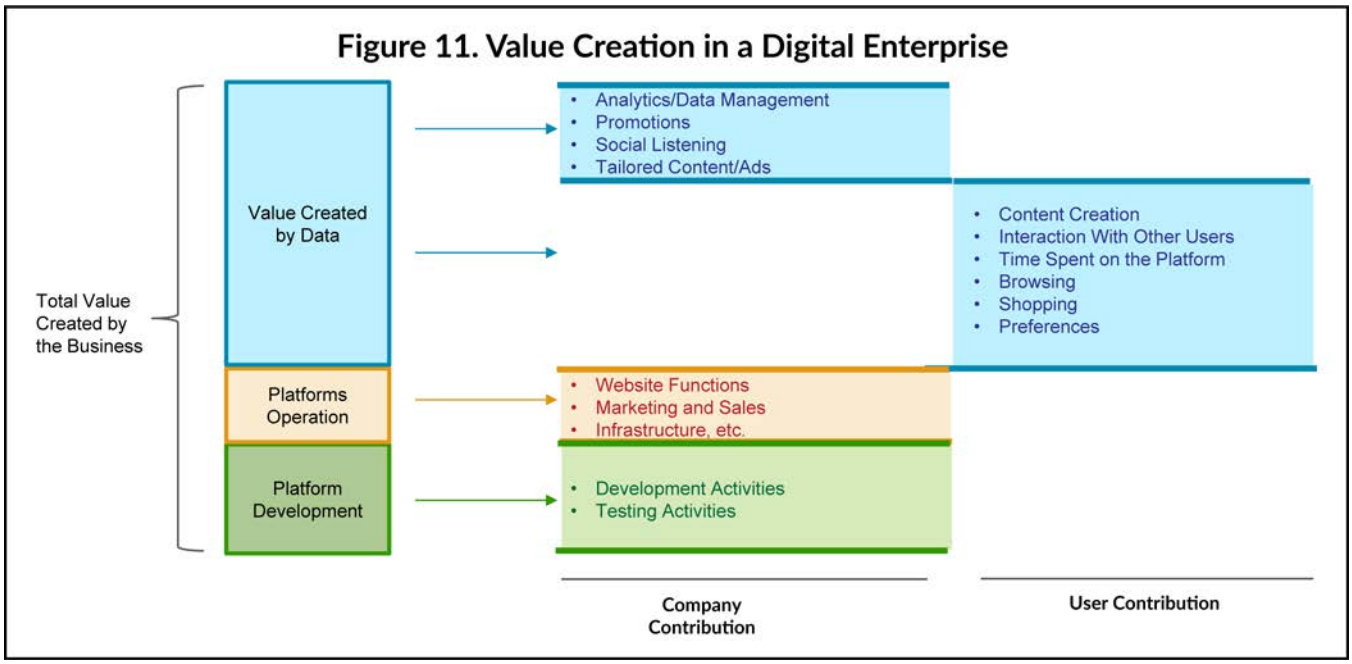


Figure 11 presents a generalized comparison between the contributions made by a digital enterprise and the contributions made by users to a stylized digital business.

Proposed Arm's-Length Tax on User Data

An analysis of the network effects and the role of users in digital business models suggests that there may be two potential contributions to the value chains of digital enterprises attributable to users — the users' contribution to the value of the network (apart from the firm's contribution to the network value) and the users' data. The relative value of these contributions varies from one business model to another. At the same time, digital businesses themselves engage in numerous activities that create value (for example, platform development to maintain and grow the network; data collection, processing, and analysis; general business operations; and sales activities).

An economically sound approach to allocating taxing rights should allocate a taxable base to market jurisdictions that does not exceed the value that users in that jurisdiction contributed to the digital business.

Conceptually, a tax on user contributions to the network should apply to firms if their business models rely on the network effect and if users contribute a measurable value to the network. These firms can be identified by using a value chain analysis to reveal the businesses' key value drivers.

A design for a tax on the other value driver that users may contribute to digital businesses — namely, their own data — can take into consideration the prices that unrelated parties charge for the user data (discussed below).

Importantly, the methods for taxing digital companies based on value chain analysis and market evidence can apply to any industry without ring-fencing any particular subset of business models.

Approaches to Estimating Users' Value

This section outlines potential approaches to estimating the value contributed to digital business models by the two value drivers linked to users — namely, user contribution to the value of the network and user data.

The approaches we discuss here are not the only possible approaches to valuing contributions that users make to digital businesses. Indeed, the methods described here may not apply if one or more of the following assumptions does not apply to the business model:

(1) a network effect is a significant value driver for the digital business (thus, the firm must have a sufficiently large number of users or customers);

(2) users make significant contributions to the network effect;

(3) the cost of access to the digital platform for users is fully or partially subsidized by unrelated parties (for example, advertisers); and

(4) the digital business routinely collects user data and applies proprietary methods and algorithms to monetize these data.

The approaches we described here will, by necessity, rely on the judgment of the analysts applying them, and they will involve estimations of various parameters that may not be precise. Therefore, these approaches will only produce approximations of the value that users contribute to the businesses. Further, the approaches we examine will often be computationally challenging.

Nonetheless, these approaches may be useful in several possible contexts, including in an empirical study (or studies) designed to develop a generalized set of parameters for allocating taxation rights. These parameters may differ across different types of digital business models. The valuation approaches may also be useful in controversies involving large digital businesses such as advance pricing agreements, mutual agreement procedures, litigation, or arbitration.

Estimating the Network Effect

The first step in estimating the user contribution should be estimating the value of the network effect for a given business. After estimating an overall value, the next step is to evaluate the portion attributable to the user contribution.

Estimates Based on Scale

The approach of estimating the network effect by comparing the current-year profitability of digital firms with large user networks and the profitability of digital firms with similar business models but smaller user networks is unlikely to produce sensible results. Firms with small user networks typically make losses or achieve very slim profits, which means that returns on assets and activities for these firms will be negative or only marginally positive. In contrast, firms with large user networks may have significant (positive) profit margins. It would be wrong to attribute the entire difference in profitability between firms with small and large networks solely to the network effect.

As Figure 5 demonstrates, profit driven by the network effect is only one part of the increased profit that a firm earns as it grows; another part of that profit increase is a result of the firm's operating activities and assets.

Estimates Based on Market Values

An attempt to value the network effect by comparing the market values of businesses with similar profiles but different network sizes (for example, social networks with small and large user bases) is likely to be erroneous as well.

The market value of a firm includes the value of future but yet unknown business opportunities, a concept that may be referred to as "goodwill" in some contexts. Accordingly, the market value of a firm in an early stage of development that still has a small network of users may include a significant goodwill value that captures the firm's expected growth. Put another way, the market value of a firm with strong growth potential may not be closely connected to its small network of existing users.

Estimates Based on Returns/Residual Value

A workable approach to estimating the network effect may involve calculating the network effect as the residual value that remains after subtracting returns on all assets of the firm other than the network from the firm's consolidated profits. The returns on "all-but-network assets" will include a combination of returns on the firm-created intangible capital and returns on tangible and routine (that is, benchmarkable) intangible assets. Notably, from a mathematical (and a practical) perspective, returns on assets as a ratio of operating profits to a specific asset base are connected to the returns on costs or revenues that are often used in transfer pricing. The returns will include a combination of returns on the firm-created intangible capital and returns on tangible and routine (that is, benchmarkable) intangible assets.

In this context, the concept of intangible capital should be understood as capitalized contributions created by non-routine activities of the firm that generate economic benefits that last longer than one year. These non-routine activities should include all activities that provide key contributions to — and serve as differentiators of — the firm's business model.

When calculating the contribution stemming from these non-routine activities, costs associated

with performing these activities may be capitalized (and amortized) over the estimated useful life of the benefits generated by the activities. This capitalization calculation will provide the value of intangible capital for the given accounting period. This calculation is conceptually similar to the calculation of the current-period net book value of the fixed assets of a business. A return on intangible capital could be computed using a rate of return on investment with a risk profile similar to that of the firm in question. Returns on routine tangible and intangible assets of a digital firm can be estimated using a transactional profit method such as a comparable profits method or transactional net margin method.

The profit attributable to the network effect can then be obtained by subtracting the returns on the firm's intangible capital and routine returns from the firm's current-period consolidated profit.

Valuing the User Contribution to the Network

The effect of a user contribution to a network may only be significant — or even detectable — for a few specific types of business models such as social networks, multi-sided digital platforms, and other platforms that rely on user-generated content and interaction among users. In any case, a value chain analysis is needed to ascertain the significance of the user contribution to the network of a particular business.

The Influencers Method

One way to evaluate the relative contributions of the users to the growth of the network (vis-à-vis the firm's own contributions to the network) would involve estimating the number of new users attracted to the network in a given time period because of the contributions of the incumbent users versus the number of users attracted to the network because of the business's own efforts. Another approach would measure the impact on revenue per user instead of the number of users. Conducting this analysis would require access to an extensive amount of the firm's internal data about the functioning of its networks.

The Broadcasting License Method

This approach is built on the analogy, albeit imperfect, between broadcasting businesses and digital business models that rely on advertising revenue and grant users free access to the platform. While this approach may obviate the need for internal data regarding the firm's network, it suffers from the imperfect parallel between the broadcast and digital business models.

Television and radio broadcasters use advertiser-supported business models, and their networks include viewers or listeners. Typically, to obtain broadcasting rights, commercial television and radio broadcasters must purchase spectrum licenses from dedicated government agencies. The broadcasting licenses cover pre-defined geographical areas and are valid for a set period of time. Often, spectrum auctions determine the price of broadcasting licenses. Presumably, the market price for a license will reflect the profits that the broadcaster expects to earn from advertising for the duration of the license. Advertising revenue and profits, in turn, depend on the content and characteristics of the target audience.

The fee a commercial broadcaster pays for a broadcasting license is the price of access to viewers or listeners. Viewed from another angle, the licensing fee can be considered the profit the government authorities obtain for granting access to the pool of listeners or viewers in a specific territory and for a given time period.

The fees broadcasters pay for the broadcasting license can be contrasted with the profit broadcasters earn after they pay the licensing fees and all other operating expenses. The ratio of licensing fees to profits represents a profit split between the government authority that grants access to users and the firm that delivers content to these users. It should be possible to compute the ratio using data on spectrum auctions and financial data from the broadcasting firms that buy the licenses.

The ratio of broadcasting license fees (which are profits of the government) to broadcasters' profits after the licensing fees could potentially be used to estimate the value of the right of digital businesses to access users in a given territory. Presumably, governments in the user jurisdictions will want to tax the value of that right.

It is important to recognize that this broadcasting license approach will not provide a precise estimate for the value of access to users of digital firms because there are many differences

between the business models used by a typical digital firm and a typical broadcasting firm. For example, digital firms collect much more data from their users and are likely to be able to monetize user data better than broadcasting firms.

Estimating the Value of the User Data

Digital firms collect a wide variety of user data through their platforms. These include users' personal data (for example, names, addresses, telephone numbers, email accounts, and IP addresses), their financial data (for example, credit card numbers and banking details), their location, the identities of their family members and friends, their search-engine queries, their personal preferences and interests, and the content they generate (for example, social media posts and product reviews).

Digital enterprises use the data they collect from the user activities in a variety of ways such as by:

- creating algorithms for targeted advertisements;
- running experiments to create better algorithms;
- improving the user experience;
- fine-tuning the existing business model; and
- developing new business models.

In the above examples, the value added to the user data is attributable to the firm's activities rather than the user contribution. User contribution to data typically takes a form of providing consent — explicit or implicit — allowing the digital firm to collect their data and track their activities.

The broadcasting license method described above may account for some of the value of the data that users contribute to the business. However, as noted, it is unlikely to capture the entire value of user data for a digital enterprise because digital enterprises can collect (and monetize) a much broader array of user data than broadcasters.

Another source for approximating the value of user data could be the market prices for the user data supplied by independent data brokers.[9] Because returns on the activities involving collection and aggregation of digital user data can be estimated — at least conceptually — using profits of independent data brokers, returns on such activities can be considered routine. However, buyers of data from independent brokers would presumably apply proprietary analytical methods to monetize the data and thereby engage in non-routine activities that earn non-routine profits (or losses).

The value attributable to the user data that digital businesses collect in market countries could be derived from market prices for that same data when it is (re)sold by an independent party. This method must take into account the fact that the firms selling user data add value to the raw data by collecting and organizing these data. Also, differences may exist in the scope of user data sold by brokers and the data collected by digital firms themselves. Thus, the data that the brokers offer are not the raw user data that the digital platforms normally capture.

Concluding Remarks

The methods for determining the value of user contribution and user data involve a substantial degree of subjectivity. Ultimately, simplification formulas may need to be developed to make taxing the value of the user contribution administratively possible. Before developing any simplification formulas, however, we highly recommend undertaking an economic analysis of digital firms with different types of business models to identify realistic parameters for such formulas. The economic analysis can also determine whether different parameters should apply to different types of business models.

Lastly, the design of a taxation system for digital businesses should recognize that market countries already benefit from digital businesses that have users there. These benefits accrue to users in the form of reduced costs for information, products, and services; and gaining access to new products, services, content, and ideas. Therefore, when taxing digital businesses in market countries, the system should err on the side of imposing lower, not higher, taxes on these businesses. ■

[9] Data brokers in the United States include Acxiom, Experian, Epsilon, CoreLogic, Datalogix, Intelius, PeekYou, Exactis, and Recorded Future. *See* U.S. Federal Trade Commission, "Data Brokers: A Call for Transparency and Accountability" (May 2014).