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Tec(h)tonic Shifts: Taxing the “Digital Economy”

by Aqib Aslam and Alpa Shah

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Tec(h)tonic Shifts: Taxing the “Digital Economy”

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Abstract

The ever-increasing digitalization of businesses has accelerated the need to address the many shortcomings and unresolved issues within the international corporate income tax system. In particular, the customer or “user”—through their online activities—is now considered by many as being a critical driving force behind the value of digital services. Furthermore, the rapid growth of digital service providers over the last decade has made them an increasingly popular target for special taxes—similar to wealth and solidarity taxes—which can also help mobilize much-needed revenues in the wake of a crisis. This paper argues that a plausible conceptual case can be made to tax the value generated by users under the corporate income tax. However, a number of issues need to be tackled for user-based tax measures to become a reality, which include agreement among countries on whether user value justifies a reallocation of taxing rights, establishing the legal right to tax income derived from user value, as well as an appropriate metric for valuing user-generated data if it is ever to be used as a tax base. Furthermore, attempting to tax only certain types of business is ill-advised, especially as user data is now being exploited widely enough for it to be recognized as an input for almost all businesses. Several options present themselves for consideration—from a modified permanent establishment definition combined with taxation by formulary apportionment, to user-based royalty-type taxes—each with their own merits and misdemeanors.

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I. INTRODUCTION¹

A new breed of “superstar” firm has come to the fore of global markets over the last decade. These are businesses at the vanguard of the so-called “digital revolution”, in which technology is being harnessed to redefine traditional business models, provide new ways for buyers and sellers to interact both locally and globally, and support flexible working arrangements. Many of these “tech giants” are capitalizing on first mover advantages and network externalities to boost profitability, secure market dominance, and become some of the world’s most highly-valued companies.²

Seeing that large highly-digitalized multinational enterprises are paying minimal tax in the jurisdictions in which they provide services, policymakers are increasingly more sensitive to the growing inadequacies of the current international corporate income tax system when it comes to generating a sufficient level of tax revenues from these businesses.³ The debate on international taxation has now coalesced around whether and how governments should be taxing these businesses and what the appropriate distribution of those revenues across countries should be (IMF, 2014, 2019). Furthermore, the rapid growth of digital service providers over the last decade has made them an increasingly popular target for special taxes—similar to wealth and solidarity taxes—which can also help mobilize much-needed revenues in the wake of a crisis. Understanding how to tax these businesses requires resolving a number of issues that have emerged as more and more businesses move steadily towards what might be termed a “digital asymptote”.⁴

The first issue relates to the increasingly sophisticated information and communications technology (ICT) systems—including the internet—that have facilitated a surge in remote cross-jurisdictional sales, decoupling economic and physical presence. Moreover, with this ability to market and sell goods and services remotely, online retailers are also challenging and displacing traditional physical stores (of all sizes). For example, in the U.S., the share of e-commerce in retail

¹ The authors would like to thank Thomas Baunsgaard, David Bradbury, Ruud de Mooij, Klaus Hellwig, Cory Hillier, Michael Keen, Alexander Klemm, Arbind Modi, Bill Morgan, Laura Power, Victoria Perry, Antje Pflugbeil, Christophe Waerzeggers, and colleagues in the Tax Policy Division of the Fiscal Affairs Department for extremely helpful comments.

² Annexes I and II explore some of the characteristics of highly-digitalized businesses using available firm-level financial accounts data and the basic theoretical background for cost structures and strategic behavior that could be driving the market structures in highly-digitalized sectors.

³ For example, see the Institute on Taxation and Economic Policy (ITEP) report: <https://itep.org/amazon-in-its-prime-doubles-profits-pays-0-in-federal-income-taxes/>

⁴ For most sectors it is useful to consider a “digital asymptote”, closer to which digital functions and capabilities heavily dominate a business model—in this way, what differentiates businesses and sectors is their relative distance from it. The highly-digitalized businesses are closer to this asymptote than other businesses, which sell a mix of digital services and physical goods and services.

sales has tripled to almost 10 percent compared to a decade ago.⁵ This has strained the traditional concept of permanent establishment, which relies on a fixed physical presence as a precondition for governments to exercise their right to tax.

The second issue is that intangible assets have a greater role than ever before, with modern multinational enterprises deriving a larger share of their value from intellectual property that is both easy to shift across borders and hard to value for transfer pricing purposes, due to lack of comparables. This has frustrated the arm's length principle and exacerbated opportunities for profit shifting.⁶

A third issue—and the core focus of this paper—is that the online customer or “user” is now considered by many as being a critical driving force behind the value of digital services. Digitalization has allowed businesses to harvest data and information about their users at an unprecedented scale.⁷ Users provide data on their preferences be it through their online search or purchase of goods and services or through their interactions with others over social media platforms. However, user participation is not recognized under the existing international tax framework as a source of taxable value. As a result, the blurred line between their role in both supply (production) and demand (sales) has—for better or for worse—opened the door to an important conversation about the concepts of source, destination, taxable presence and profit attribution.

A number of policy proposals have been put forward which seek to limit the scope of tax avoidance and tax competition, by attempting to pre-determine a distribution of taxable profits across countries. Many are predicated—implicitly or explicitly—on the idea that the “user” has a role to play in value creation, justifying the designation of source-based taxing rights to the jurisdiction in which they are located (see, for example, European Commission, 2018; HM Treasury, 2017). Most prominent among these are the proposals for pure formulary apportionment, or a hybrid residual profit allocation alternative, both of which include some measure of user value as an allocation key. Another related proposal is the allocation of profit to

⁵ Based on quarterly e-commerce sales report from the 2019 U.S. Census Bureau.

⁶ With more and more businesses reliant on intangibles and capital—including computerization and automated systems that can be described as “robots”—there is an inevitable overlap between the international taxation of highly-digitalized businesses, wealth taxation, automation, and the future of work. This alludes to the larger theoretical debate over the taxation of capital, in a world where labor's share in output continues to shrink and returns accrue to a smaller subset of the capital-owning population (Karabarbounis and Neiman, 2014). Unaddressed, it is possible that domestic revenue mobilization will continue to be undermined as technology-intensive corporations and high-income individuals continue to game jurisdictions and structure their operations to minimize their tax liabilities.

⁷ The physical distancing implemented in response to the 2020 COVID-19 pandemic has pushed a vast amount of business activity online as large sections of the workforce work remotely. Similarly, with non-business activities, given heavy restrictions on personal movement. The associated surge in online activity means that even more data is being captured than in the past by highly-digitalized businesses whose services have become essential for business continuity and leisure activity, such as Amazon, Cisco, Netflix, and Zoom.

market jurisdictions based on marketing intangibles, also justified by the notion that soliciting the sustained engagement and active participation of users is a critical component of value creation. In the interim, a number of countries have begun to implement user-based turnover taxes, targeting specific digitalized industries and activities.

However, many of these recent proposals have tended to restrict the scope of special tax treatment, singling out activities or business models which are seen as particularly data intensive. Yet as noted in IMF (2019), the collection and use of potentially monetizable information is so pervasive in today's economy, that drawing a line between cases in which users are and are not material contributors is inevitably fraught. It would seem that if user data is indeed being exploited at a scale large and wide enough for it to be both recognized as an economic input to production and protected on behalf of the user, it should be recognized for all businesses.

With these issues in mind, this paper attempts to understand more comprehensively the role that "user-generated value" can and/or should play in determining the structure of the future corporate tax system. To begin with, both businesses and government would need to agree and acknowledge that there is such a thing as user-generated value. This remains contentious as some countries and companies claim that user data has no value until it has been processed—before then data is worthless. In addition, if they agree that value is being created, we need to understand how much. It has so far proven tricky to come up with an objective basis for valuing user data and network externalities. For example, without a spot market for data (as there is for physical commodities such as oil, etc.), there is no benchmark against which specific data can be valued, given the underlying variation in user characteristics. Subsequently, from a tax perspective, how should user-generated value confer source-based taxing rights? And how should profits be allocated to reflect this value? A clear measure of user value would help answer this question, for example, by serving as a factor in any formula apportioning profits. Finally, beyond the corporate income tax, are there alternative fiscal instruments which countries can and/or should deploy to secure their "fair" share of user-based revenues?

Section II explores the role of the user in digitalized business models. Section III then discusses the way in which recognition of the user as a source of profits might alter both the designation of taxing rights and the apportionment of profits. Section IV considers alternative instruments for taxing the returns to user participation, drawing on lessons from the taxation of location-specific rents in the extractive industries. Section V concludes.

II. UNDERSTANDING USER-GENERATED VALUE

In this section, the focus is on the exchange between users and a digitalized business and explore the claims of whether the former generate "value" for the latter. The internet—including the decreasing fixed costs of accessing it—and increasing global connectivity have provided the opportunity for e-commerce transactions to grow substantially, vastly increasing the potential number of users and the scale and scope of their digital activities. Two ways users are purported to create value are as follows:

- The first is the provision—or allowing for the collection—of personal data and creation of digital content, which can then be monetized by the business. Connectivity and the ability to record and digitize everyday life means that individuals produce trails of information almost continuously as they consume goods and services. The data being generated and harvested from these users is not only vast but also an integral part of the business models of the most digitalized businesses, allowing the services offered to be better refined for new and existing users.
- The second is the role that users play in building networks, which are also critical to the viability of many of these digital business models.

Of course, the idea of collecting and monetizing customer data is not inherently new—the practice of maintaining customer lists and designing loyalty and incentive rewards programs started as far back as the late 1800s. However, given the recent surge in such data collection and processing activity, it is important to devote some time to understanding the user in the digital context—their place within new business models and the role they play.

A. The User

Let us take a step back to clarify some key terms and relationships. In any transaction, the “user” is typically identified as the buyer or consumer of a good or service, regardless of whether the transaction takes place physically (in person) or virtually (online). Below are some specific examples of how users interact with digitalized businesses (and one another) to help clarify the types of individuals we are considering in this paper:

- When purchasing a good online, the user reveals information about their preferences, which are recorded by the business for future use and monetization.⁸ During this transaction the user is exchanging not only a financial payment for a good or services, but also data about themselves in exchange for the use of the online marketplace’s facilities. Where a third-party digitalized platform intermediates transactions between a buyer and a seller (two-sided markets), both parties are also considered users of the service.⁹
- A user can browse the internet using a ‘free’ search engine service or mobile application, without ever financially transacting. In this case, the user is sharing and revealing information

⁸ Even though the value of business-to-business e-commerce transactions is larger, it is business-to-consumer and consumer-to-consumer e-commerce transactions that are the primary focus in the current debate.

⁹ Companies can help users to economize on transaction costs by providing virtual platforms or meeting places for their customers to conveniently search and browse for goods and services, review ratings from past purchases, leave feedback, and provide payment. These online marketplaces simply extend the notion of a traditional farmers’ market to the cyber realm (Aslam and Shah, 2017). They also help reduce the minimum efficient scale for individuals to operate businesses—allowing individuals to operate at a much smaller and more economically-viable scale—and access large customer bases. This has enabled individuals to sell anything from goods (e.g., craft goods) to services such as accommodation, advertising (as social influencers), and transportation. Such opportunities afforded by digitalization have driven the expansion of the flexible, task-based peer-to-peer or “gig” economy.

about themselves and their interests as they do so, in exchange for accessing search (and match) services.

- A user can interact with other individuals over social media platforms. They can post information and generate digital content, for example, educational material, experiences, photos, videos, views about and reactions to events, or promote certain goods and services in the role of social influencer. In doing so, again the user is revealing information about themselves as they use the platform, trading it in return for the ability to share it with their community.
- A user can be operating a device that is connected to the internet and through which the manufacturer collects data on its users. This is increasingly common with the “internet of things”—the networking of everyday physical objects embedded with sensors to send and receive data (for example, thermostats, vacuum cleaners, toothbrushes and cars).

The more exchanges that take place, the greater the flow of data from the user to the business and the larger the information set about the user collected—that is, the stock of data about the user increases. And while previously personal data might have been restricted to discrete facts (such as name, age, income, address, health and education history) in a computer database, the data collected by digital service providers consists of vast real-time flows of unstructured information on individuals’ web browsing activity and use of web applications.

Common to all of these interactions is that as the user takes advantage of various digital services—through the so-called “digital barter”—they also unwittingly exchange other critical inputs—data on their preferences and activity, which can then be used and monetized by the business. In many of the examples, this digital barter does not require there to be a financial transaction through an online marketplace. Users instead consume a range of apparently “free” digital services, for example, browsing websites and reviews for products and services, or expressing opinions through “likes” and “dislikes”. In reality, they are, of course, not free to the users, who are in fact engaging in multiple “micro-barter” transactions in which data about their activity and preferences is being incrementally exchanged for a digital service.

While recent highly-publicized data breaches have raised awareness about the corporate practice of personal data collection and trading, it seems fair to say that a large majority of users have been unaware of the extent to which they are “passively” generating personal data that is being harvested and monetized.¹⁰ When signing up for a service, users typically consent—without fully

¹⁰ Grinberg (2018) makes the comparison with data collected from participants in a clinical trial by pharmaceutical and medical research companies in exchange for “free” medicines. While there may be relevant comparisons to be made with these sectors from the point of view of intangibles, this analogy does not seem appropriate in the context of personal data collected by digital service providers, as individuals that participate in medical research and clinical trials have to qualify and meet certain criteria. Trial participants also actively and willingly consent to the use of their detailed private medical information. Furthermore, the highly regulated nature of the trials differs from the current system of data collection by digitalized businesses.

realizing—to this monitoring of their digital activity, with little or no option to maintain privacy. Some companies are even able to follow a user’s activity when they are no longer using their platform through the use of ‘tracking cookies’.¹¹ Similarly, a number of web applications have access to a user’s location even when they are not actively using the application. In these cases, data is observed by the business and collection is carried out with the user’s formal consent—for example, by accepting terms of service—but without their direct involvement, active transmission, or complete understanding.

Some observers distinguish between this type of “passive” data generation, provided unconsciously while consuming digital services, and “active” user contributions on social media platforms. In the case of passive data collection where the user’s role is limited to their prior consent, it has been argued that it is the business and not the user who really “produces” the raw input data (Becker and Englisch, 2019). As such, “mere acquiescence” to being observed should not be deemed as co-creation of value by users. These observers argue that only when user data is actively solicited or provided—e.g., in the form of survey or complaint—should users be regarded as creating value. However, in practice, the line between active and passive data provision is not only difficult to draw, but more importantly is potentially irrelevant as long as both types of data have value and can be monetized.

B. The User Data

Once collected, this data is used by the companies in a number of different ways. For example:

- Businesses can use the data to refine existing or develop new products and services, similar to the way in which customer focus groups are used.¹² Large consumer data sets are now also being used for the development of data intensive machine learning and artificial intelligence technology.
- Companies can analyze data using increasingly complex techniques to discern behavioral trends and preferences for marketing purposes, for example to create more targeted advertisements for their own products and services, influencing existing customers to purchase more or attracting new customers. It can also be used to provide advertising services to third parties looking to access new users and expand their sales.
- Data can be used by digital platforms to customize and improve search and matching functions. Recommendation engines are one example—they suggest goods and services that

¹¹ Cookies are small text data files that are stored locally on the computers and physical communications devices of customers. They are left on the device’s browser when the customer visits the vendor’s website for the first time and help the vendor recognize that device on subsequent return visits to the site.

¹² On some platforms, users are unwittingly even training business algorithms, for example, to recognize faces by observing how users tag photos on social media platforms, and in identifying traffic patterns and optimal routes by tracking driver movements on navigation applications.

a user might enjoy based on matching their preferences with those of other users deemed similar. This benefits the user in future interactions by reducing the time and cost of search.

- Data can be sold in its raw or processed form to other businesses, which can then refine it further for use or sell it on again. An industry of data mining and brokerage firms has emerged that specializes in the collection and sale of consumer data sets. These companies harvest data using multiple access points across a range of internet-based activities, and then package it for sale to retailers and advertisers.¹³

Given the different ways digitalized businesses can benefit from user data, they have invested heavily in honing techniques to collect and analyze it. As such, consumer data has now become a strategic asset for most retail businesses, many of which rely on data acquired to maintain a competitive advantage by way of knowledge-based product improvements or services.

While the collection of personal data by companies has raised a number of issues around the right to data privacy and the appropriate use of such data, at the heart of taxation debate, and the focus of this paper, is the issue of compensation for the use of this commercially-valuable data. Given the information asymmetry between the user and the company with respect to data collection and use, as well as the lack of options to maintain privacy, it is unclear that users are currently being adequately compensated for their data in the digital barter. And if they are not, should they be remunerated directly, and then taxed under the personal income tax schedule with that remuneration deducted at corporate level? Or should the government tax a portion of the profits of digitalized businesses on their behalf? In other words, should user-generated value establish source-based taxing rights for the country in which the users reside? And if so, how would such a system operate?

A number of observers have proclaimed data to be the 'oil' of the twenty-first century (Gupta and others, 2017). Indeed, increased data collection and processing capabilities have driven a large amount of new economic activity. And just as natural resource companies explore for and then extract crude oil from designated national deposits using exploration and extraction technology, user data is collected from individuals through the provision of 'free' digital services—the "digital barter". In the same way that resource companies either sell crude oil to refineries, or process and refine the commodity themselves into various oil-based products for onward sale, data is either traded among brokers, or processed to facilitate the provision of revenue-generating data-intensive services. And in both cases, the underlying assets, the users,

¹³ The industry includes not only the large technology companies but also entities such as credit ratings agencies (e.g., Experian) and data analytics firms (e.g., Axiom and Oracle). In cases where data is mined and gathered by such firms, rather than via the provision of digital services, users are left entirely uncompensated and unaware of the use of their personal data. Regulations around such web 'scraping' or 'mining' are only now emerging.

as with natural resource assets, are immobile, or unique to a particular location, giving rise to the possibility of 'location-specific rents' (Cui, 2018).¹⁴

The analogy with natural resources is, of course, not exact: unlike information, oil is a rival good. Varian and others (2005) note that rather than data 'ownership', the more appropriate concept for data is "access". Given that data is not usually depleted in the manner that private physical goods and commodities are, access to the underlying pool or asset can instead be licensed for specific uses. Thus, while in the resource sectors, the scarcity of the non-renewable resource leads to the generation of large economic rents when extracted, in the case of personal data, the source of large-scale rents, if they arise, are not due to the scarcity of the resource, but rather the natural monopoly and excludability characteristics of these businesses described in Annex I.

Despite these differences, the analogy with natural resources may provide valuable comparative insights for the tax treatment of user-generated data. First, the case for allocating taxing rights over resource rents to the host country is widely accepted and legal provisions to create such taxing rights are well established. Second, as data becomes increasingly standardized and commoditized, valuation methods for natural resources could prove useful, as well as the institutional and regulatory frameworks that would be necessary to achieve this. Third, international practice in tax policy towards the extractive industries may provide insights into how best to design a fiscal regime to appropriately tax potential large economic rents from data extraction. These aspects will be considered in further detail in Section IV.

C. The Value of User Data

We now turn to the question of how to determine the value of user data. This will be an important ingredient in formulating methods for apportioning and attributing company profits to countries where users are located, which we cover later in the paper.

Does data even have any value?

This determination, of course, requires some common acceptance that raw data, before any processing by the company, does in fact have some inherent value. This would seem logical, just as any primary commodity has some value before it is transformed into a final product (for example, crude oil, which has value in its raw form upon extraction) before any processing.¹⁵

¹⁴ Location Specific Rents refer to economic returns in excess of the minimum "normal" level of return that an investor requires – "rents"—which are uniquely associated with some specific location and can thus be taxed without in theory having any effect on the extent or location of the underlying activity or asset. See "The Taxation of Offshore Indirect Transfers—A Toolkit", issued in July 2018 for consultation by the Platform for Collaboration on Tax. Available at: <https://www.imf.org/en/News/Articles/2018/07/13/pr18297-the-platform-for-collaboration-on-tax-invites-final>

¹⁵ Varian (2019) describes a data pyramid to depict the relationship among data, information, and knowledge. A system must be designed to first collect the data, and subsequently organize and analyze that data in order to

Many digitalized businesses have, however, claimed that such data is only valuable once it has been analyzed and processed—that is, that the real value comes from the application of intangible assets, such as algorithms and coding, which are used to interpret data and provide the revenue-generating service. The latter reasoning has been used to undermine the assertion that a portion of the profits of highly-digitalized businesses can be attributed to users, and to instead claim that all value creation is done at the level of the firm that manipulates the data. While it may well be the case that a large portion of the value realized from data is generated in the processing stages, it may equally be argued that without any user data to process there would be no value realized at all.

Moreover, user data is a nonrival but excludable “club” good—similar to other inputs such as “know-how” or “ideas” that feature in endogenous growth models (Romer, 1990)—which benefits only those businesses that collect, buy, trade, and process it.¹⁶ The company would not be incentivized to collect user data—by providing services for free—unless there were some value to doing so. The fact that companies maintain proprietorship over the data that they collect on their users is one facet that allows companies to secure market power and extract (and preserve) rents. If all user data were to be made publicly available, the value derived from this excludability property—and the competitive advantage it confers—would disappear.¹⁷

Determinants of data value

With this in mind, what are some of the attributes of data that determine its value? From the perspective of the firm, user data is a very heterogeneous good and—and therefore its value—is likely to depend on the type of digital service being provided, as well as the characteristics of the data, such as quality, utility, and the availability of substitutes. For example:

- The value of user data will depend on its vintage, quality, and sensitivity (for example, data value may change over time in response to security issues, litigation, or legal regulations which affects how it can be used).
- The value of user data will vary from one individual to another based on their economic profile, e.g., their affluence (purchasing power), propensity to spend, and consumption habits, and therefore the extent to which their engagement with a platform can be

turn it into information that can be understood by humans, the insights from which can be turned into knowledge.

¹⁶ Data can be conceived of as an intangible capital input to production—distinct from other forms of physical or human capital.

¹⁷ That is not to say that businesses could not still charge users or governments for collecting, storing, and processing this public data even if they do not own it—as is the case with renting out cloud computing services. But instead, companies would have to rely to a far greater extent on their algorithms, intellectual property, and other intangible assets to derive rents from digital interactions with users without ownership and control over user data. It is unclear what would happen to competition and therefore rents if data were to be made public, though it is likely the former would increase, driving down the latter.

monetized (HMT, 2018). In this way, the average value of data will also vary by country based on the distribution of its users and its economic size, and so on.

- The value of user data can change around key life events, such as marriage or childbearing. These events can present lucrative advertising opportunities.
- The value of user data can depend on the intensity of a user's engagement with a service. Some users are much more active and generate significantly larger data volumes than others—increasingly accurate user profiles may make them more or less valuable to a company.
- The more users a business has, the more valuable the aggregate dataset collected for the purposes of inferring trends and preferences. That is, the value of data is likely to increase more than proportionately with the volume collected—this non-linearity is driven by network externalities that are discussed a later in this section. This will also vary by firm, as well as by the amount of data already in the firm's possession.

As we can see, given that users can generate data of differing quantity and quality, valuing data can be complex and highly context dependent. Moreover, since raw user data is not widely traded on markets but often stays within the firm that has produced it, it is hard to value, because its economic usefulness depends on the individual capacity of their acquiring firm to distill relevant information from it and subsequently to use this information to meet customer needs. Companies can also combine publicly available and proprietary data to create unique data sets for sale or use.

Conversely, from the perspective of the user, how they value their data will depend on their preferences regarding data privacy, as well as the value they place on the service which they are trading their data for—both the initial service as well as the customization of that service which may be derived from previous user activity, for example, better targeted advertisements. Just as for firms, these values will vary by individual, and will depend on the degree of trust in the firm's integrity regarding data usage. For those that value privacy increasingly highly, the net benefit of using digital services will be lower. In addition, the perceived profits accruing to the businesses that harness this data could factor into the user's willingness to engage in the digital barter.

Imputing the value of data

At present, there is very limited information on how data is or could be valued. Even though private markets exist in which data brokerage business sell information about consumer purchase habits, little is known about the value of such sales. It is possible to get some idea of the value of user data—much like intangibles—from past mergers and acquisitions, as well as bankruptcies. Examples include the sale of RadioShack's data in February 2015 following its bankruptcy; Microsoft's acquisition in December 2016 of LinkedIn (approximately US\$ 260 per user); and Facebook's acquisition of Instagram in April 2012 (approximately US\$ 20 per user) and WhatsApp in February 2014 (approximately US\$ 42 per user).

Small-scale efforts have emerged to create a user-centric personal data economy that empowers individuals to retain control over their data and in some cases monetize it themselves (for example, Datacoup and Meeco). The converse approach is the “pay for privacy” model, where consumers pay an additional fee to prevent their data from being collected and mined for advertising purposes (Elvy, 2017). Although not yet widely used, these efforts also provide some initial indications of how users value their own personal data.

The issue at hand is therefore how to value a commodity for which there are no market prices or established benchmarks. Open and transparent markets in which standardized units of user data can be traded have failed to develop so far, preventing businesses and governments from quantifying data inputs to production. Institutions, regulations, and transparency are therefore needed to build economy-wide (minimum) rules and establish benchmark values for different types of data. Then, just as for oil, adjustments can be made to determine country-specific values for user data.

In the absence of such benchmarks, policymakers might look to more observable proxies of user data value. Some proposals have looked to the final revenues of companies from certain activities. However, unlike natural resources, data is not a physical commodity that can be traced from the point of extraction to a specific point of consumption. Rather it will likely be blended, processed, and analyzed for use in delivering a wide range of goods and services in a range of different countries. In some cases, profits may be realized from data (through its use in product improvement or refining machine learning processes) many years after it has been collected. In these cases, it may be almost impossible to determine ex-post which portion of the profits are attributable to the initial user data, even though it provided a critical input. The nonlinear value of data poses an additional challenge in establishing a method to “netback” from these final revenues to the initial information used as inputs to digital services.

One exception may be the case of advertising, where data is used as an input in determining the placement of person-specific (and, therefore, location-specific) advertisements.¹⁸ In principle, each advertisement viewed by a particular user has an associated value, determined by auction according to the willingness to pay by online retailers, which would presumably correlate closely with the relative value of the initial data provided by that user to the business. Of course, the blending of data from different sources, possibly across different countries, when determining

¹⁸ Advertising services provided by large multinational enterprises such as Google or Facebook are typically priced using instantaneous sealed-bid auctions across businesses, which are triggered every time someone conducts a search. Companies can specify the target audience of their advertisement, as well as minimum and maximum bid parameters. Bids are typically made on a cost-per-click, a cost per viewable impression (i.e., the number of times the advertisement shows in a viewable position), or a cost per acquisition, (i.e., when users take a specific action on a website after clicking the advertisement, such as a purchase or sign-up).

how to best target advertisements would mean that the value of the advertisement is only a proxy for the value of that particular user's data.¹⁹

More generally, if revenues are used to derive a proxy for user value, what would be necessary then is an agreement on the size and scope of netback deductions, reflecting any post-data collection processing, in order to determine the value of the initial information used as inputs to these services. In the case of extractive industries, countries often use the net smelter return concept, taking the international market price of the final refined metal product as a benchmark and making deductions for treatment and refining costs to derive the value of the mineral at the point of extraction. We will return to this analogy in more detail in Section IV.

User value from network externalities

Beyond the use of personal data in production, the other much-cited source of user-generated value is the role that users play in creating valuable networks for digitalized businesses. The success of digital platforms relies on the interaction between both buyers and sellers, which gives rise to strong complementarities—notably, network and information externalities—where the value in transactions increases for both groups as the numbers on each side increase (Armstrong, 2006; Caillaud and Jullien 2003; Ellison and Fudenberg 2003; Evans 2003; Rochet and Tirole 2003; Rysman 2009).

Of course, such network effects have existed well before digitalization (Katz and Shapiro, 1985, 1994; Liebowitz and Margolis, 1994).²⁰ For example, the underlying idea of a ride-sharing application is that each individual user adds to the pool of users that make up the network and thereby increases the overall value of the service. This concept applies to a number of both digital and non-digital networks. In a non-digital setting, a farmer's market is more valuable to buyers and sellers alike, if there are more farmers and more shoppers participating. Newspapers and television networks are another widely-referenced example where network externalities exist between the market of readers and advertisers. Collier (2018) and Collier and Venables (2018) also highlight how the externalities associated with urban agglomeration produce rents that accrue to a small group of individuals and businesses (the "urban surplus").²¹

Digitalization has exponentially increased both the scale and the speed with which network effects ratchet up. Users posting on social media provide content that can quickly attract other

¹⁹ It is likely that the advertisement displayed on a user's screen may not be a simple function of their own data but may rather be derived from a large pool of data from other 'similar' users, particularly if a retailer is entering a new market or if the user is new to the platform.

²⁰ The literature also distinguishes between *direct* network effects—e.g., the usefulness (and therefore value) of a telephone increases if more consumers own telephones—and *indirect* network effects—e.g., the value of a games console increases with greater sales of that console, as owners can benefit from the fact that companies will produce more products (games) for that particular console.

²¹ Henry George was the original proponent, in 1879, of a tax on the value of land to capture some of the benefits of land appreciation in urban areas.

subscribers, and the more users engage with one another on the platform, the more content they create and so on (OECD, 2018). And the more users there are on the platform, the more the firm will invest in its development. There are also information externalities: users on retail platforms provide feedback through reviews that influence other users of the platform in their consumption choices. While users might be acting in their own interest, their actions both attract other users and reveal more and more commercially-valuable information about themselves, creating increasingly valuable opportunities for marketing and product improvement. Other digitized markets also display such scale effects, such as in the financial services sector (for example, credit card services) and in the insurance market where liquidity and heterogeneity of participants is particularly important.

Given the existence of network externalities in both digital and nondigital marketplaces, they would not appear to justify ringfencing digitalized services and taxing them differently. However, some governments feel that they are a source of rents for the businesses that capture growing user bases. Cui (2018) also notes the location-specificity of network effects (both direct and indirect) as the source of a location-specific rents. Moreover, the policy implications are unclear. On the one hand, the network externalities highlighted so far appear to be positive—they generate increasing value for users that are part of the network. From the perspective of optimal taxation, a positive externality in a one-sided market would in fact lead to the under-provision of the good or service, so the government should instead subsidize it to increase its production. On the other hand, for two-sided markets, Kind and others (2008, 2010) show instead that increasing (ad valorem) tax rates—rather than subsidies—can increase output and enhance welfare.

Even if policymakers could rationalize the taxation of rents, the network externalities that generate them can be just as challenging as user data to evaluate. Cui (2018) provides a theoretical description of how user value (encompassing both data provision and network effects) could be measured. Such a method requires measurement of the demand curves for a range of products and services, and measurement of the changes in such demand curves upon the introduction of online reviews and customized advertising, from which one can calculate the increase in producer surplus arising from such changes. As we proceed to examine how a system which allows countries to tax user generated value might operate, we leave aside the notion of user generated network externalities, and instead focus on value generated from user data.

Taxation or Regulation?

More generally, one might question whether tax is the right tool to address the issue of seemingly excessive rents generated through network externalities. Markets where network effects exist without any interoperability between providers typically tend towards monopoly, in

the absence of any intervention.²² As a result, there has been a rapid consolidation of power among certain digitalized businesses—such as internet search and social media firms—which have been able to develop some of the largest user bases thanks to these positively reinforcing network effects. Facebook, for example, has over 2 billion users as of 2019, which is about 70 percent of the world’s population that has access to internet.²³ This market concentration has reinforced the ability of only a handful of digital platforms to monopolize the aggregation and analysis of large amounts of personal data.

Indeed, when markets tend to natural monopoly, taxation is not typically the optimal policy response—regulation is typically the first best. The approaches can vary from breaking up monopolies into smaller units (e.g., AT&T’s Bell system in 1982) to price regulation—some of which can create their own distortions (Newbery, 2000). At present, few of the recent wave of digitalized businesses have been subject to any form of anti-trust regulation in the U.S. The previous notable case was that of Microsoft in 2001, in which it was asserted that the company was using its control over the personal computer market to force out competing operating systems and browsers. Google could be considered a potentially similar case, given its dominance of search and, therefore, advertising services—notably, the European Commission has already fined it for manipulated search results (EUR 2.42 billion in 2017) and for bundling activities (EUR 4.34 billion in 2018).²⁴

In the case of Amazon, some have argued that the company has become a utility—given its distribution infrastructure, which is used by many other businesses—and is engaging in anti-competitive actions by pricing below cost to eliminate competitors or force their acquisition by sale (Khan, 2017). While this has not triggered reaction thus far, as the impact is admittedly to the benefit of the consumer, this “antitrust paradox” is reducing competition across the retail sector. Price regulation could be a natural response by regulators to such tactics.

What is ultimately important to note is that the economic features of platform-based digitalized businesses can incentivize rapid growth over profits in the short term to secure market dominance (Annex I). This tends to make anti-competitive behavior, such as predatory pricing and the large-scale acquisition of competitors, a rational strategy. Furthermore, for those sorts of

²² Grinberg (2018) noted that while the fax machine network displayed network effects, the interoperability of fax machines made by different manufacturers and the further interoperability between various telephone providers meant that the network effect did not lead to a monopolistic result.

²³ About 40 percent of the world population has an internet connection today. In 1995, it was less than 1 percent. The number of internet users has increased tenfold from 1999 to 2013. The first billion was reached in 2005, the second billion in 2010, and the third billion in 2014.

²⁴ In 2018, the European Commission ruled that Google has abused its Android market dominance in three key areas: (i) bundling its search engine and Chrome apps into the operating system; (ii) blocking phone makers from creating devices that run multiple versions of Android, and (iii) making payments to certain large manufacturers and mobile network operators to exclusively bundle the Google search app on handsets. In 2017, Google was fined for abusing its market dominance as a search engine by promoting its own comparison-shopping service in its search results and demoting those of competitors.

digital platforms where network effects lead to substantial market share through access to excludable user data, and where breaking up companies into smaller (more regional) units does not necessarily solve the problem, price controls—where applicable—are the more efficient tool. Ultimately what works for one type of digitalized business might not be appropriate for others, making a business-by-business (or sector-by-sector) approach necessary. For example, specific regulation bills—akin to the U.S. 1996 Telecommunications Act—that govern a wide range of activities, from data collection and privacy to ethical content, might be necessary for those companies that provide certain types of universal services, e.g., messaging and social media.

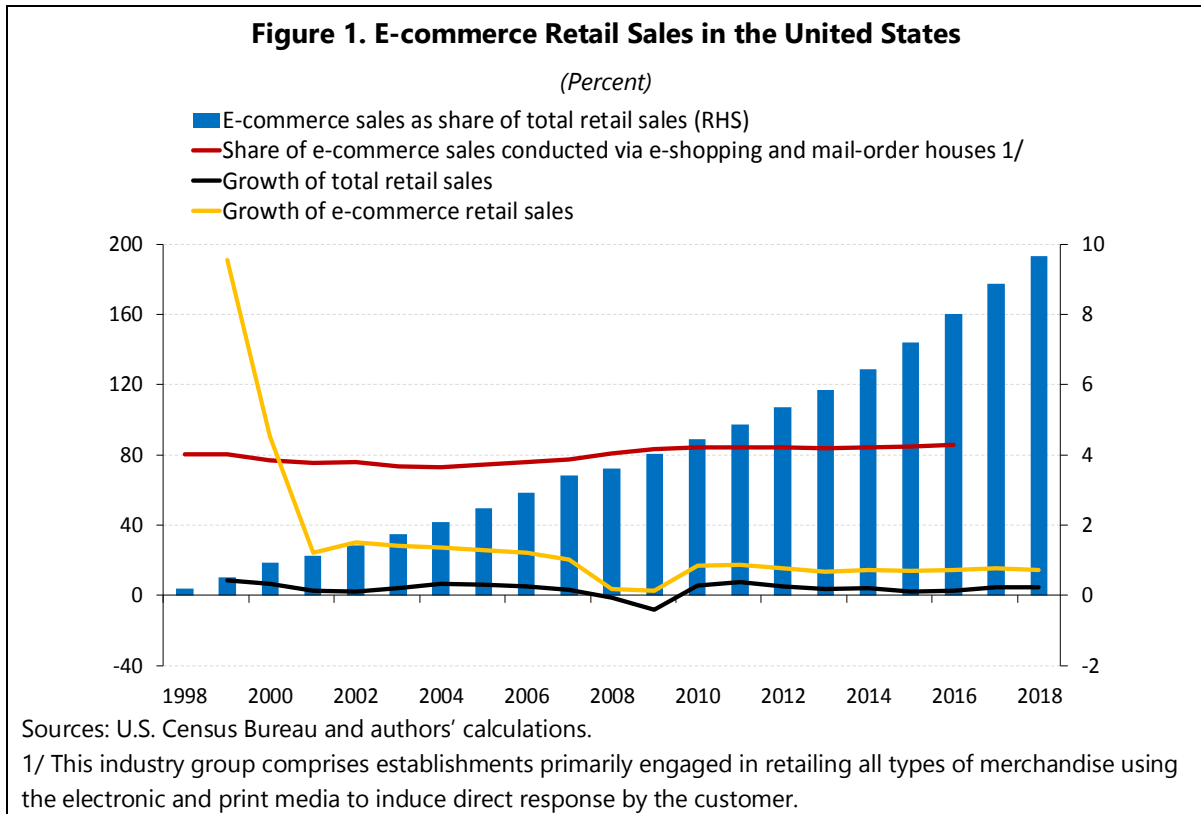
As Grinberg (2018) observes, the nature of these markets suggests that tax and regulation need to be appropriately distinguished in the digital economy debate. With ever-increasing market share, rents from monopoly power over information are likely to increase. By resorting to taxation as a means for redistributing the rents being generated by user-derived network externalities, the question is whether tax policy is being used to treat a symptom, whereas regulation might be more appropriate to address the underlying cause.

III. THE USER AS THE BASIS FOR THE RIGHT TO TAX AND ALLOCATING PROFITS

Section II established how the nature of digital service provision sees the user play a dual role in their exchange with the service provider: the user is a producer of valuable information (while also generating network externalities) and a consumer of digital services. It is the potential difference between the values of these two legs of the exchange that many governments implicitly contest. They see users in their countries being insufficiently compensated for the inputs they supply in return for a service that has a marginal near-zero cost to provide (Annex II). The uncompensated value accrues to the firm exploiting the information, boosting their rents, which on most occasions lies beyond the legal reach of the government.

In order to remedy the inadequate compensation of users for valuable inputs, some governments claim that the location of users—that is, where they consume digital services and thus where the valuable data input is generated—should confer both the right to tax and a share of profits. Indeed, one of the hallmarks of digitalization is the decoupling of market (or user) presence and the physical presence of companies. Even the smallest unincorporated business can operate more easily across borders as a result of digitalization. Furthermore, the network effects discussed in Section II and the ability to provide remote services have allowed many of these businesses to build large global user bases, providing them the opportunity to collect that much more valuable user data, without any physical presence in these countries. Figure 1 highlights how e-commerce sales have formed a growing share of retail sales in the United States over the last two decades, accounting for almost 10 percent of the total in 2018, with over 80 percent carried out through online platforms.²⁵

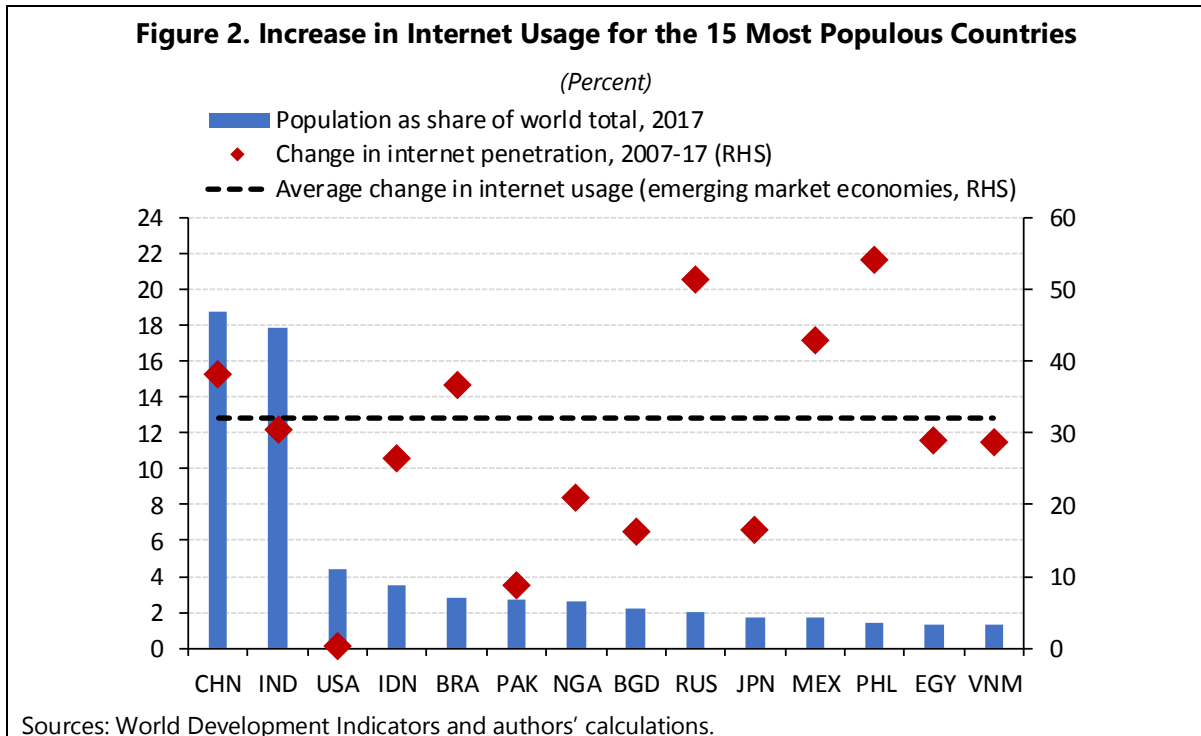
²⁵ According to the definition provided by the U.S. Census Bureau, e-commerce sales are sales of goods and services where the buyer places an order, or the price and terms of the sale are negotiated, over an internet,



We can also see the growing opportunities for both remote selling and network scale effects for highly-digitalized businesses when we consider just how large the increase in internet penetration for the world's most populous emerging market economies has been. For these, the average increase in internet usage in the 10 years since 2007 has been over 30 percent and represents approximately 1.4 billion new users (Figure 2).

If we accept the premise that users contribute value, the first step is to establish a legal basis for taxation in the countries in which users are located (Section III.A). One related question is whether "user countries" should have supply-side source-based rights—with users as factors of production—or demand-side destination-based rights. Annex III clarifies the distinction between users as a rationale for "source"- or "destination"-based corporate income taxation. The second step is to determine how users can be part of any profit allocation strategy (Section III.B). In other words, establishing taxing rights is a necessary but not sufficient condition for allocating profits. These are the issues and questions we turn to in this section.

mobile device (M-commerce), extranet, Electronic Data Interchange (EDI) network, electronic mail, or other comparable online system. Payment may or may not be made online.



A. Designating Taxing Rights

The Production and Ownership of User Data

Establishing a right to tax the income (or rents) derived from user-generated value relies on carefully disentangling the relationships between the user, the digitalized business, and data being traded between them. Typically, under rights conferred through national legislation and contractual agreement, the owner of any factor of production is directly remunerated by a business for its use and that income is then subject to tax in the jurisdiction in which the factor is located. However, with largely undefined property rights over personal data, and in the absence of legislation governing the collection of or access to data, ownership over user data is implicitly vested in the companies that collect it, with no legal obligation to compensate the individuals that have generated this data—beyond the digital service for which this data may have been exchanged. Many companies also feel justified in owning the data as it is their intellectual knowhow and technology that enabled the collection, storage, and processing in the first instance. Furthermore, once collected, non-rival user data can be used repeatedly by the business and even sold to other businesses. Without any rights or control, users are unable to extract the full return on their data.

Ultimately, there is a dilemma over who should have ownership or control over user data, either explicitly through legal property rights or implicitly through compensation for its use. Does the data belong to the user, or the firm that collected it? Should it be held in trust by the government on behalf of its citizens? If these issues can be defined more clearly, it might then be possible to determine the basis on which the user (or government) can be compensated. Recent

reforms have gone in this direction, with greater attention paid to regulating the privacy of users and control over their personal data, the stringency of which has implications for both ownership and value, and, therefore, the possibility for compensation of users.²⁶

If we take the view that the underlying subject of the data, the user, is entitled to compensation for its use, then the nature of such compensation will depend on the ownership or control of the data once it has been collected. If the data is owned by the company, then the relationship between user and business could be analogous to that of an employee and employer, where the former has been actively engaged by the latter and whose time and inputs should be contracted and compensated, but who do not own their “work product”—in this case, the user data.²⁷ The level of compensation could in this case reflect the present value of the data, which may, of course, be used repeatedly by the firm over time. Alternatively, if the ownership or control over data remains with the user, then there would need to be mechanisms in place to allow businesses to access and remunerate users accordingly, perhaps either on a per-use basis or over a certain time period. From a taxation perspective, if the user is compensated directly for primary sale of or access to their data, this remuneration would be deducted at the corporate level, and the user would simply be taxed under the personal income tax schedule—in a manner similar to a self-employed business that declares its income earned.

A related issue is whether users should be individually compensated or whether the government should be compensated on their behalf. Indeed, the nonstandard and person-specific nature of data—together with the ability of individuals to move location, change nationality, etc.—might suggest that individuals should directly be compensated for access to or collection of their data. Unlike a sub-surface natural resource that is generally acknowledged to be a collective national asset, it could be argued that user data is an inherently personal asset that lends itself more readily to the notion of individual sovereignty.

However, for individuals to be able to exercise and enforce these rights requires not only a strong legal system, but also additional shifts in technology. For example, for users to have full ownership and control over their data, they would need to be able to take it with them between digital platforms, retrieving and sharing their data as they move from one digital service provider

²⁶ New data privacy requirements (e.g., the European Union’s General Data Protection Regulation 2016/679) apply to a wide range of companies and activities, including search engine, social media, online retailers. However, consumers face an implicit trade-off between better-targeted services and the protection of their data. Goldfarb and Tucker (2011) show how privacy regulations or attempts to protect people’s privacy have affected how well digital advertising works—a small change in how much data could be used can reduce the effectiveness of advertising by up to 66 percent. Therefore, it is possible that the quality of service is compromised if rights and access are more heavily regulated.

²⁷ There are also numerous practical, legal and administrative issues with treating users—both regular and casual, numbering in the millions for many digitalized businesses—as employees, leaving this notion as a loose but instructive analogy at best.

to another, or at least monitoring its use. Therefore, the nature of system and software interoperability and data portability would need to evolve.

Moreover, the nature of the exchange of user data for digital services might raise practical questions regarding the feasibility of compensating each user for their data or access to the data. As noted earlier, digital barter are not large, infrequent transactions between businesses but instead are small, high-frequency “micro” transactions between businesses and consumers across multiple separate online platforms. For example, social media platforms and search engines record billions of “likes” and queries each day, respectively. The value of the data being traded in these “microbarterers” is likely to vary significantly, and the current lack of a transparent market or an agreed standardized measure for the value of such data further exacerbates the difficulty in determining and reporting a verifiable person-specific financial value for each exchange.

A more practicable alternative might be achieved if custody over citizens’ data were assigned to the government as a proxy. For example, in the case of natural resources, governments typically hold the resources in trust on behalf of their citizens and collect payment for extraction in the form of government revenues. In the case of digital services, data on the behavior and preferences of a country’s citizens would be seen as a collective national asset with compensation for its use payable to the government. Indeed, a government is better placed to exert collective power on behalf of individuals who cannot capture their rents by levying a tariff (for example, an export tax) on the extraction of data by foreign digital service providers (Hufbauer and Lu, 2018; IMF, 2019). This arrangement would apply whether data ownership is transferred to the company upon collection, or retained by the government, although the arrangement chosen (i.e., time-bound access or indefinite ownership) would have implications for the level of compensation. And indeed, while user data is intrinsically tied to an individual, the nature of data collection and the fact that the nonlinearly-increasing value from user data is often derived—not only from aggregating data related to a large number of individuals but also from multiple points in time—also suggests the practical need to centralize ownership so as to coordinate access and compensation.

If such an arrangement were developed, companies that wish to collect user information would then need to compensate the jurisdiction in which the information was collected in accordance with agreed rules, through the corporate income tax system or through other tax instruments such as a payment of a royalty, a concept which will be explored further in Section IV. Such an arrangement still does not obviate the need for clear valuation rules around the data collected but does allow for the possibility of using country-level proxies or formulary methods for determining user value, which will be explored further in this section.

Reappraising the Permanent Establishment Concept

For governments to have the right to tax the returns associated with user data through the corporate income tax system, there needs to be an explicit legal basis on which to recognize the economic activity of data collection in the local jurisdiction. The traditional basis for a

government to exert taxing rights over a foreign multinational enterprise doing business and deriving profits from their activity in their jurisdiction is the concept of “permanent establishment”. It is this concept that needs to be reappraised to facilitate source-based taxing rights over value generated from user data.

A permanent establishment exists when a multinational enterprise—highly-digitalized or not—has nexus based on “significant economic presence” in a country such that their economic integration with the local economy crosses some threshold. Threshold tests are typically specified in domestic legislation and/or double tax treaties, and have been designed to determine the degree to which a foreign company is integrated locally. Typically, the test specifies that a permanent establishment exists if the multinational enterprise has a fixed place of business within the target country or if there is a dependent agent that regularly exercises the authority to conclude contracts locally on its behalf.

The collection of data from users—regardless of whether it is in exchange for a digital service or not—is typically conducted remotely by the business without any physical presence in the country of the user and therefore does not create a permanent establishment under current definitions. While large online retailers typically operate storage and distribution centers in market jurisdictions, these are typically exempted in treaty definitions of permanent establishment (OECD, 2017b, Article 5, para 4). Local affiliates are also commonly structured to have no ownership interest in intangible assets, perform no development, enhancement, maintenance, protection, and exploitation functions, and do not assume any risks. Accordingly, only a modest return may be allocated to these “limited risk distributors”.

While activities such as local data collection or warehousing were previously considered to be of a merely auxiliary nature—typically contributing only marginally to business profits and therefore neglected for the purposes of profit allocation or justifying only low profit attributions—they now form core elements of digitalized business models. In other words, previously simple routine functions for which it was generally acceptable to allocate only a small share of the overall business profits have arguably become key activities for many firms, with a pivotal role for data analytics.

However, this surge in cross-border business-to-consumer sales as a result of digitalization has taken us into a grey area. Traditional exporters of goods and services have never been subject to permanent establishment for tax purposes in importing countries. This could be due to the fact that the majority of exports were typically from business to business, especially in the case of intermediate goods. However, the scale of growth of peer-to-peer exports, as well as exports of retail and intermediation services by highly-digitalized businesses, is straining the traditional permanent establishment concept. As businesses increasingly digitalize, the user in the importing country generates valuable inputs for an increasing number of exporters. By ignoring these issues, a consequence of a tax system that relies solely on physical presence to assert taxing rights is to create variation in the cost of capital between businesses exporting to and those producing domestically for the same market.

Any solution that calls for a different allocation of profits beyond what the current system enables will need to be supported by new or expanded taxing right. As has also been acknowledged under the OECD's (2019b) Pillar One proposal (the "unified approach"), the current definition of permanent establishment would need to be modified to establish the right for user-jurisdictions to tax multinational enterprises that collect data on their citizens. Until then, a multinational enterprise can sidestep the nexus issue by operating remotely, or establishing local affiliates that are not entitled to an appropriate share of the group's profit.

Many have already put forward ways to modify the permanent establishment concept. For example, online retailers, warehouses, and distribution networks developed to cater to users (buyers and sellers) were previously excluded from the definition of the permanent establishment in the existing version of the OECD Model Treaty (OECD 2017b). However, Action 7 of the OECD/G20 Base Erosion and Profit Shifting (BEPS) Project and Article 12 of the Multilateral Instrument provide a basis for an extensive application of the permanent establishment concept to account for the fact that these functions are no longer merely auxiliary, but instead form a strategically decisive component of the business model. Some countries have also already taken steps to change the permanent establishment threshold tests in domestic legislation to include them (Table 1).

User-based approaches

In proposing options to extend the permanent establishment concept to include the location of the user and their data, a number of approaches focus on characteristics of the market. OECD (2018) sets out options for modifying and expanding the permanent establishment definition to include a range of quantitative and qualitative benchmarks, such as the number of registered users, the number of active users, the amount of revenue earned within a market, the level of expenditure, or the existence of a local domain, a dedicated local digital platform and local payment options. Hongler and Pistone (2015) suggest establishing a new permanent establishment nexus which includes a user threshold, a time threshold, and a de minimis revenue threshold.

Recent legislative developments have also provided glimpses into the way that users can qualify as a form of nexus. In a landmark case, the United States Supreme Court ruled in June 2018 that physical presence should not be required for a state to compel out-of-state sellers to collect state sales tax on sales to customers in their state, thereby overturning its own precedent dating back to 1992.²⁸ In other words, a company can now be obliged to collect sales tax from the consumer for the jurisdiction in which that consumer is located, even if the seller has no physical presence there.²⁹

²⁸ The ruling is in respect to South Dakota's law, but has implications for all U.S. states.

²⁹ Despite the physical presence test no longer applying, the Supreme Court made it clear that the Commerce Clause remains in place and can still protect companies from any undue burdens on interstate commerce.

Specifically, the wording of the majority opinion noted that: “a business may be present in a State in a meaningful way without that presence being physical in the traditional sense of the term.” The opinion goes on to say that “[i]t is not clear why a single employee or a single warehouse should create a substantial nexus while “physical” aspects of pervasive modern technology should not. For example, a company with a website accessible in South Dakota may be said to have a physical presence in the State via the customers’ computers. A website may leave cookies saved to the customers’ hard-drives, or customers may download the company’s application on to their phones. Or a company may lease data storage that is permanently, or even occasionally, located in South Dakota.”³⁰

The idea that virtual access to a catalogue of people (for example, Facebook); products (for example, Amazon, eBay); services (for example, Airbnb, Uber); or other websites (for example, Google) could be equivalent to an individual visiting a physical shop—in this case corresponding to social clubs, department stores, letting agents and taxi services, or public libraries—and browsing these items in person, is a powerful notion. The devices that provide users with mobile market access and the opportunity to browse goods and services from any location—computers or mobile phones—could therefore form the basis for location-specific permanent establishment based on the location where the user is when they use a service. In a number of countries, servers already give rise to a permanent establishment even if the business has no other presence. In February 2012, India’s Authority for Advance Rulings ruled that a foreign company’s server constitutes a permanent establishment for tax purposes, and the profits arising from it are taxable—so including devices would be an extension of that existing concept.³¹ This was also later clarified in the commentary to the updated UN and OECD Model Tax conventions, at least in cases where multinational enterprises own or lease a whole server, although not in cases where they rent a space on another entity’s server (OECD, 2017b).

Even before the Supreme Court case, U.S. states had already attempted to use novel interpretations of physical presence to establish nexus and impose sales tax collection obligations on out-of-state retailers: the so-called Amazon laws. For example, in September 2017 Massachusetts adopted a “cookie nexus” law, under which out-of-state sellers are deemed to

Consequently, businesses still have the ability to challenge any state’s nexus law, they just cannot fight the law based on the physical presence test.

³⁰ In the end, the case upheld the nexus rules of the South Dakota sales tax, that is, on a yearly basis delivering more than US\$ 100,000 of goods and services into the state or engaging in 200 or more separate transactions for the delivery of goods or services into the state. By taking this broader approach to nexus, the Supreme Court sidestepped questions such as whether cookies, apps, etc. can amount to physical presence, as this would have “embroil(ed) courts in technical and arbitrary disputes about what counts as physical presence.” (South Dakota v. Wayfair, Inc., 585 U.S. ___ (2018))

³¹ Servers are tangible objects that can store and transmit large amounts of data, and that companies use to conduct business. In the case of web-based companies, servers store and transmit every piece of information for an entire business. Even though servers may be physically present, a number of countries contend that they have to perform certain activities before then can constitute a permanent establishment.

have a physical presence in the state simply by placing a cookie on the computer or device of an in-state purchaser.³² Ohio followed suit with a similar law, under which nexus is presumed to exist when a vendor uses “in-state software” to sell taxable goods or services to local customers. As early as 2008, some states have enacted so-called click through nexus statutes, which define nexus to include out-of-state sellers that reward in-state residents who refer potential customers through links on a website.

However, even cookie nexus, while a novel approach, can run into familiar threshold questions as to whether a cookie can be considered a significant physical presence. It can be argued that the electronic data that comprises a cookie is intangible and therefore incapable of creating a physical presence. A cookie, after all, cannot physically be held, weighed, or touched on its own. But the idea of what can be considered “tangible” is expanding in many contexts.

Investment- or Asset-based approaches

Other approaches focus on the company’s investments to access a market and develop its customer base. For example, Schön (2018) contends that if it can be shown that a digitalized business has invested capital in a market to access a specific customer base, this investment can give rise to taxing rights in the respective market country. Not simply because there is a market with customers ordering goods or services, but because the company has invested into that market and expects a return on this investment.

However, to contain the proliferation of small permanent establishments around the world, one would have to introduce a meaningful qualitative and quantitative threshold on that investment, such as singling out specific digital elements of that investment and setting a minimum amount of investment to bring forward the right to tax. It would also require carving out the part of the firm’s investment that is of a general nature and the part that is devoted to individual markets. For example, for firms which process user-generated content like Facebook, Instagram, Snapchat, Twitter or YouTube, this would require identifying how much has been invested in providing “free” communication services to these customers, in order to create market access for the profit-generating advertising business run by these firms. Likewise, Google invests in a local market by providing search functions to local customers, which enables them to sell advertising slots to business clients.

While this approach is fully in line with basic legal and economic assumptions about the corporate income tax, it is clearly not related to the “benefit principle” in its classical geographical form. This is because these “country-specific” investments may be targeted at a local customer base, but they are not dependent on any spatial relationship to the market

³² The regulation provides that a vendor has physical presence to the extent that (among other requirements) it has “property interests in and/or the use of in-state software (e.g., ‘apps’) and ancillary data (e.g., ‘cookies’) which are distributed to or stored on the computers or other physical communications devices of a vendor’s in-state customers, and may enable the vendor’s use of such physical devices.” The collection requirement is only imposed to the extent that the vendor’s annual sales total at least US\$ 500,000 or 100 individual transactions.

country or any specific public goods provided by the market country. Taxing the returns on these sunk investments could still be justified in economic terms as far as they represent location-specific rents that are immune to erosion by tax competition.

Along the same lines, an alternative proposal for establishing physical presence and allowing market jurisdictions a basis for claiming more taxable income—albeit only to a limited extent—focuses on “marketing intangibles”. These are broadly-defined assets that can include brands, goodwill, and trademarks, as well as user data (OECD 2019a).³³ Some businesses have also suggested that marketing intangibles account for the labor inputs (or “significant people functions”) involved in their creation. Advocates for this option acknowledge that the value of marketing intangibles is linked to the market in which sales to users take place, potentially meaning that the market country is the ‘source’ of value for the marketing intangible. Once rights have been assigned, a formula would be required to allocate profits to the various newly-empowered jurisdictions.

Overall, this proposal aims to prevent unnecessary ringfencing while also helping to preserve the existing arm’s length pricing. However, many companies—notably in the pharmaceuticals industry—contend that by using marketing intangibles to extend taxing rights, a disproportionate share of profits would be moved away from research and development towards populous end markets. Should marketing intangibles form the basis of a new approach, there is a risk that policymakers may limit its application to only those business-to-consumer businesses for which such intangibles are sizeable: that is, certain types of businesses end up being targeted and ringfenced.

Moreover, distinguishing marketing intangibles from other types of intellectual property is a difficult exercise. Just as with user data, the subjectivity of the value of marketing intangibles remains an issue that could lead either to disputes between territories or to an arbitrary formula that is not based on any core principles, meaning it could change at any time as political consensus shifts.

A related proposal has been put forward by Becker and Englisch (2019), who define the concept of a “sustained user relationship” built on the repeated provision of online services over time. This concept can serve as a proxy for the potential to legally collect certain types of data from a user continuously and on a large scale, and to exploit them commercially. This sustained user relationship—defined over some threshold—could be used to establish nexus for the allocation

³³ A “marketing intangible” is defined in the 2017 OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations as “an intangible ... that relates to marketing activities, aids in the commercial exploitation of a product or service and/or has an important promotional value for the product concerned. Depending on the context, marketing intangibles may include, for example, trademarks, trade names, customer lists, customer relationships, and proprietary market and customer data that is used or aids in marketing and selling goods or services to customers.” (OECD 2017a, p.27). In its March 2019 comments to the OECD, Johnson & Johnson proposed a formula for profit attribution, starting with a fixed percentage of global operating profits, and adjusting it based on overall group profitability and business marketing expenditure across countries, subject to a ceiling and floor.

of taxing rights. As the authors themselves note, this nexus criterion does not differ markedly from an approach that emphasizes user participation. But for the purpose of profit allocation, the significance of the user relationship and the corresponding access to data could be more helpful for granting permanent establishment rather than assessing the value of uncompensated (user) labor.

Hence, one could treat the sustained user relationship as an intangible asset of the business that maintains it and can rely on it to systematically milk the relevant user data. This intangible also clearly would have a positive monetary value, in the same way previous corporate acquisitions have seen large amounts exchanged for user databases. Yet the valuation of this intangible remains as fraught as valuing the individual data. In this case, certain attributes of the data might be more relevant, such as the quality and strength of a typical relationship over time.

Table 1. Country Approaches for Significant Digital Presence	
Country	Digital Permanent Establishment Definition
European Commission (Proposed)	A digital platform will be deemed to have a taxable 'digital presence' or a virtual permanent establishment in a Member State if it fulfils one of the following criteria in a taxable year: <ul style="list-style-type: none"> • >EUR 7 million in annual revenues; • >100,000 users; • >3000 business contracts for digital services.
India	In April 2019, a significant economic presence test was proposed, where (i) domestic transactions in respect of goods/services/data exceed a threshold for the previous year, or (ii) where there is a systematic or continuous soliciting of domestic business activity or users by digital means. A foreign entity meeting either of these tests will have a permanent establishment, regardless of whether they have any physical presence. However, this rule will not be effective in cases where the foreign entity is located in a country with which there is a tax treaty. As of February 2020, the application of this test has been deferred to April 2021.
Israel	In April 2016, a significant economic presence test was introduced which asks: (i) whether there are a significant amount of contracts with domestic customers for internet activity; (ii) whether there are a significant amount of domestic customers using the digital service; (iii) whether the online service is adapted for use by domestic customers (for example by using local language and currency), (iv) what is the level of internet activity by domestic customers, and (v) whether there is a correlation between use by residents and payments to foreign entities.
Nigeria	In January 2020, the Finance Bill signed into law the principle of significant economic presence to the basis of taxation of non-resident companies operating in the digital services and e-commerce sectors.
Slovakia	In March 2018, the definition of a fixed place of business was expanded for foreign online platforms offering transport or accommodation services in the country.

B. Allocating Profits

Even if the presence of a taxing right were to be agreed and resolved comprehensively, there are still some steps left before profits can be taxed. These include: (1) attributing the level of profits to each country, and (2) determining how these profits will be taxed. The second steps remain under the sovereign purview of the country once it has secured the right to tax profits. It is likely to consist of the application of the domestic corporate income tax to this new enlarged tax base—and there are many alternative structures to choose from. However, the first step is more involved and relates back to the measurement of user value and the overall identification of business functions/factors that could determine how profits should be distributed.

Two broad approaches currently exist for profit allocation, broadly categorized by arm's length pricing (the incumbent) and unitary taxation (the challenger). Under the current framework, governments defer to the choices that multinational enterprises make over how they internally organize themselves across multiple jurisdictions—between branches, holding companies, parent companies, subsidiaries, etc.—all of which have important tax consequences. Instead governments attempt to regulate the transactions between these units.³⁴ Under the alternative, governments would attempt a top-down division of the company's worldwide income, allocating it across countries using a formula based on some combination of locally measurable factors such as capital, payrolls, and sales (IMF, 2014). While companies could reorganize their real activities in response to the system, they would not, in principle, be able to shift flows purely for tax purposes.

Separate Accounting

Many criticize arm's length pricing for a number of reasons. First, it runs into practical implementation difficulties when balance sheets comprise significant amounts of unique, highly-valuable yet hard-to-value intangible assets, as is the case for highly-digitalized companies. It is relatively easier to discover a reasonable arm's-length price of a barrel of crude oil for which there is a spot market—that is, some form of comparable asset. It is less clear what the comparable is for unique intellectual property, such as patents and trademarks. For digitalized businesses, no matter how assiduously one performs “functional analyses” designed to identify “uncontrolled comparables” that are reasonably similar to transactions undertaken between members of multinational groups, they are hard to find.

Second, multinational enterprises frequently use this system to reduce the amount of tax they pay by diverting profits offshore through contrived structural arrangements between related

³⁴ In other words, while a company is free to divide itself as it sees fit, when it attempts to move assets internally from one part to another, it must ensure that the price of the transaction is near the price independent parties would agree upon—as if the transaction were happening with an unrelated party. In theory, this system ensures that corporations doing business in multiple countries are not taxed twice on the same income, while also ensuring that governments have a tax base rooted in economic reality. Furthermore, it does not distort organizational form.

parties, such as intellectual property transfers and related royalty arrangements, marketing/distribution/procurement hubs, and offshoring services. As a result, profits are often not being taxed even once in existing source or residence jurisdictions thanks to the use of transfer mispricing and no-or-only-nominal tax jurisdictions, violating the single tax principle.³⁵

Third, separate accounting systems treat each affiliate of a multinational enterprise as a distinct entity with its own costs and incomes. However, allocating income and expenses across countries is not only complex because of the lack of comparables, but also conceptually unsatisfactory, given that worldwide income is generated by interactions between affiliates across countries. Multinational enterprises exist in large part because these interactions generate more income than separate domestic firms interacting at arm's length. Requiring firms to allocate this additional income among domestic tax bases is necessarily artificial and arbitrary, therefore, because it would disappear if the related entities operated at arm's length.

In the case of user data collection, the separate accounting approach would involve establishing the associated income and costs for the multinational enterprise, as if the data collection agency were a separate enterprise. However, as digitalization leads to the pooling of data across countries, separate accounting adds additional layers of complexity on top of the aforementioned valuation issues (Section II.C). Opportunities for transfer mispricing would likely increase even further, given the difficulty of determining precisely how much of the enterprise's income is attributable to data collected by affiliates in one country versus another.

In sum, the application of arm's length pricing is not only increasingly difficult but unrealistic as intangible assets come to dominate company activity and value. The irony is that multinational enterprises arose precisely to avoid the inefficiencies that arise when unrelated companies must transact with one another at arm's length. Frustrations with their abuse of the arm's length principle and the growing shortcomings of current nexus requirements for permanent establishment highlight the inadequacies of this approach.

Formulary Apportionment

The formulary system disregards all of these legal distinctions and simply looks at a company as a large, single unit. Based on factors such as sales, payroll, and assets, along with threshold tests, the system divides a business' income among various taxing jurisdictions in which it is conducting activity. Intercompany transactions are therefore ignored and income-shifting curtailed, reducing profit allocation disparities between high- and low-tax countries.

Indeed, the debate over some form of formulary apportionment of profit has been ongoing for some time (see, for example, Altshuler and Grubert, 2010; Avi-Yonah and others, 2009; Avi-Yonah, 2010; Graetz and Doud, 2013). Such a realignment of taxing rights is likely to lead to a

³⁵ Under the current system, the benefit principle implies that active (business) income should be taxed primarily by the country of source and passive (investment) income should be taxed primarily by the country of residence (Avi-Yonah, 2015). The single tax principle states that cross-border income should be taxed once at the rate determined by the benefit principle. In other words, cross-border income should typically be taxed only once at the source-country rate if active and at the residence-country rate if passive.

redistribution of profits across countries through the reallocation of the tax base from low to high-tax jurisdictions. It could also potentially alter the size of the pie available for distribution, due to differences in loss treatment between separate accounting and formulary apportionment, which consolidates losses at the global level before apportionment (Fuest and others, 2007; Cobham and Loretz, 2014). On the merits of formulary apportionment as an alternative to arm's length pricing, we refer the reader to other pieces (see, for example, Altshuler and Grubert, 2010, de Mooij and others, 2019).

There are a number of strengths of applying a formulary apportionment system to accommodate increasing digitalization. Firstly, as the nature of business changes, the formula can be augmented (or reduced) to account for those factors that are most critical for determining a business's connection to a location—and the base for its tax liability. Formulae often vary by sector, such as in Canada, where special factors and weights apply to insurance, banking, and transportation, and in the United States³⁶, where Alaska uses an origin-based sales factor for extractive industries (de Mooij and others, 2019).

Secondly, formulary apportionment does not need to apply to all profits. To the extent that some countries demand that a certain portion of profits must remain within their jurisdiction, apportionment can then be applied to "residual" profits (see next section). Again, in the case where market countries demand a share of profits given the contributions of their users, profits can be first split, with only a certain fraction available for apportionment using some sort of user-based factor.

User Data as a Factor for Formulary Apportionment

This section proceeds to focus on how a formulary apportionment system could effectively account for value created by digitalized businesses from user data. To prevent any unnecessary ringfencing of specific digital services, we must design an expanded formula for all businesses to account for new factors that have become relevant because of ongoing digitalization in every sector. And we must consider how these factors should be weighted relative to the others (i.e., sales, assets, payroll).

The specification of the formula can have important implications for a number of reasons. For example, the inclusion of certain factors, such as assets and employment, creates an implicit tax on them, discouraging their accumulation in high-tax locations.³⁷ Furthermore, not all of these factors might be relevant for gradually digitalizing businesses. Payroll is one such case, which

³⁶ The United States already uses formulary apportionment domestically to determine the taxable share of U.S.-source corporate profits across states. States can choose their own formulae and current examples include: (i) a formula with 3 factors: sales, assets, and payroll equally weighted; (ii) the "double-weighted sales" formula, which is (i) with sales double-weighted; and (iii) sales as the sole factor. The third option has been adopted by states over time to remove any incentive to shift employees or facilities to other jurisdictions.

³⁷ More generally, formulary apportionment has implications for tax setting incentives (and, therefore, tax competition), as well the organizational form of the business (Gordon and Wilson, 1986; IMF, 2019).

might find itself increasingly irrelevant: given the ability to sell remotely, there can be virtually zero labor presence in certain markets and therefore zero apportionment.

The principle that taxes should be applied “where value is created” fails to provide any definitive guidance on relevant factors (Devereux and Vella, 2018). As we have discussed, there are many activities that create value for digitalized businesses on the demand or supply side. Yet not all of these activities are directly generating profit. The chosen formula can potentially combine a number of location-specific factors from both sides of the market. If measurable, these could include, for example:

- *From the demand side:* sales, population (total or by age); mobile phone and internet penetration (as a proxy for usage of digital services). For example, internet usage is near universal amongst young adults (<50 years), college graduates, and those from high-income households.³⁸
- *From the supply side:* assets (total, tangible, intangible), employees (or payroll), users (volume, value of data they provide).

To the extent that user data itself can be measured and valued, it can potentially feature in the formula. The latest draft proposal for the EU-wide Common Consolidated Corporate Tax Base includes a fourth data factor that reflects the collection and use of personal data of online platforms and services users.³⁹

One proxy for user value would be the volume of users, which can be measured in many different ways. For example, a country’s population could represent the potential maximum volume of users in each jurisdiction; alternatively, we could consider volume as that part of the population that has access to mobile telephony and the internet. However, using population as a proxy for the volume of users introduces a number of possible complexities.

First, the population of a country is not static—it can change over the course of the year for many reasons. Moreover, the user population will include foreign nationals that are resident in the country as well as its own citizens and exclude local nationals living abroad. In other words, migration flows alter the population of a country throughout the year, especially in the case of

³⁸ The Pew Research Center has identified how internet usage varies by demographic groups in the United States. For instance, seniors are much more likely than younger adults to say they never go online. Although the share of non-internet users ages 65 and older has decreased by 7 percentage points since 2018, 27 percent still do not use the internet, compared with fewer than 10 percent of adults under the age of 65. Household income and education are also indicators of a person’s likelihood to be offline. Roughly three-in-ten adults with less than a high school education (29 percent) do not use the internet in 2019, compared with 35 percent in 2018. But that share falls as the level of educational attainment increases. Adults from households earning less than \$30,000 a year are far more likely than the most affluent adults to not use the internet (18 percent vs. 2 percent).

³⁹ Amendment 10 of European Parliament legislative resolution of 15 March 2018 on the proposal for a Council directive on a Common Consolidated Corporate Tax Base (European Commission, 2018).

seasonal flows such as tourism, which can in many cases swell the numbers in a country at any one time—e.g., small island tourist destinations.

Second, even with accurate statistics which can be used to gauge the flows and stock of users in each country, the units used to measure “volume” need to be defined very clearly to reflect the intensity of usage by each member of the population, e.g., the number of active users in the population⁴⁰, the number of clicks during a fixed period of time, or the number of completed purchases by users in a country. In April 2019, India proposed assigning different weights to different categories of digital businesses depending on the level of user-intensity—namely, 10 percent to the users for those business models involving low or medium user-intensity and 20 percent those business models involving high user-intensity. However, the determination of intensity remains undefined.⁴¹

Moreover, it is not necessarily the case that each user is equally valuable both within and across countries. Certain income and demographic profiles would matter more for some businesses than others. For example, users from countries with higher per capita incomes would be more valuable for retail businesses in terms of level of activity and purchasing power, and suggesting that those economies should have a larger apportionment of profits.

The choice of factors can have important implications for the distribution of profits (Figure 3). Large, populous economies that are both large source and destination economies, such as the United States and China, would secure a larger share of profits under formulary apportionment with greater sensitivity to users (proxied by the size of the population). However, other destination countries with large markets would gain substantially, while small-source countries would lose. To the extent that formulary apportionment is applied universally, tradables sectors with global supply chains would be affected disproportionately.

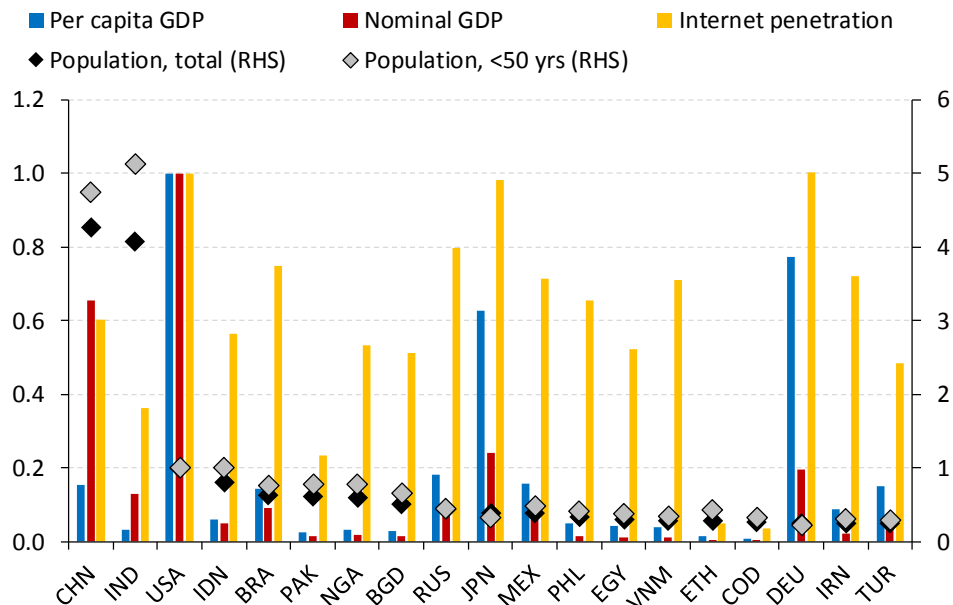
In addition, longer-term demographic trends that mean that the share of the youngest in the population—that is, those that typically use technology and digital services more frequently and intensively—is set to expand in certain parts of the world while contracting in others. In this case, user based factors would imply a gradual reallocation profits to these economies—notably in Africa and Asia—where demand for digital services is likely to be greater.

⁴⁰ Monthly active usage is commonly computed by many highly-digitalized businesses internally to measure the number of unique customers who interacted with their products or services in a month. However, there is currently no industry-wide standard for the definition of an “active user” (e.g., passive visitors vs. registered users).

⁴¹ See India’s Central Board of Direct Taxes (April 18, 2019) “Public consultation on the proposal for amendment of rules of profit attribution to permanent establishment-reg”.

Figure 3. Distribution of Alternative (user-related) Factors for 20 Most Populous Economies, 2018

(Multiples of U.S. quantities; United States=1)



Sources: IMF, World Economic Outlook database; International Telecommunications Union; UN Department for Economic and Social Affairs, Population Division, and authors' calculations.

Note: RHS=right-hand side

Residual Profit Allocation

Alternative forms of apportionment have also been proposed that allocate only “residual” profit by formula (Devereux and other, 2019, Avi-Yonah and others, 2009; IMF, 2019).⁴² Such forms require distinguishing between “routine” and “non-routine” returns to investment. The routine return can be calculated in a number of ways: for example, it could be associated with the economic concept of normal profits, calculated as some markup on costs incurred by the businesses in each country or a fixed minimum return on tangible assets (e.g., similar to the United States provision for Global Intangible Low-Taxed Income). In doing so, it can also still allow for partial use of the existing arm’s length pricing approach.

The key notion is that residual profits are those harder to attribute to specific jurisdictions, that is, the profits of a business after the activities of service providers have been awarded an arm’s length return. Once calculated, these profits can be allocated using an agreed-upon formula. This allocation of residual profits, while arguably adding a new layer of complexity, eliminates the existing complexity in measuring and valuing intangible assets. While still administratively

⁴² The OECD’s unified approach under pillar one, released for consultation in October 2019, follows this approach.

complex, such a hybrid solution may be more politically palatable and expedient than comprehensive formulary apportionment, as it more closely resembles the current system.

One application of this method in a digital setting—though not part of the current OECD proposal for a unified approach—would be to attribute a portion of these residual profits to the value created by the activities of users, using quantitative/qualitative information or through a simple percentage. This portion of profits could then be allocated between the jurisdictions in which the business has users, based on an agreed allocation factor, as discussed above.

IV. ALTERNATIVE APPROACHES TO TAXING USER VALUE

Section II introduced the analogy between user data and natural resources. In this section, we consider how other revenue-raising instruments could be used to compensate countries for the use of their citizens' personal data, drawing on experiences from the extractive industries. We also discuss the need for changes to the VAT to account for the increased volume of digital services provided by nonresident businesses. As we will discuss, while the VAT should simply be expanded to ensure remote digital services are included, there are other fiscal instruments that may present attractive substitutes for or complements to the current corporate income tax as a means to capture user value. Moreover, we show that under certain conditions, even in the absence of agreement over the approach, the widespread implementation of unilateral user-based tax measures by governments would tend in the limit to the outcome under a user-based apportionment of global profits.

A. Royalties on User-Generated Value

Taxing User Value: Lessons from the Extractive Industries

The approach to taxation in the extractive sectors has evolved over time, in line with a shifting balance of power between host governments and investors. Hogan and Goldsworthy (2012) note that, prior to World War II, governments typically granted concessions to investors to explore for and extract natural resources in exchange for a relatively low burden of initial bonuses, royalties, and land rental fees. Decolonization after World War II and establishment of the permanent sovereignty principle⁴³ drove the desire of a number of resource-rich countries to receive a larger share of the resource rents, at which point fiscal regimes began to involve the increased use of state participation, income taxes, ad-valorem royalties, and other revenue instruments.⁴⁴

⁴³ The United Nations adopted resolution 1803 (XVII) on the "Permanent Sovereignty over Natural Resources" on 14 December 1962. This resolution provides that States and international organizations shall strictly and conscientiously respect the sovereignty of peoples and nations over their natural wealth and resources in accordance with the Charter of the United Nations and the principles contained in the resolution. These principles are set out in eight articles concerning issues such as the exploration, development and disposition of natural resources, nationalization and expropriation, foreign investment, and the sharing of profits.

⁴⁴ In the developing world, a number of contractual schemes were developed in the mid-1960s, such as the production sharing contract, and fee-for-service contracts in the context of fully nationalized industries.

One might conclude that similar trends are emerging with respect to the ‘extraction’ of personal data. With largely undefined property rights and legislation over personal data, its collection and use have gone largely uncompensated, except indirectly through the taxation, if any, of overall returns under the current corporate tax system. However, governments are now exerting greater sovereignty over their citizens’ data, and seeking a ‘fairer’ global distribution of tax revenues, both through the corporate tax system and through the application of new instruments, as will be discussed in this section.

The key objective of extractive industry fiscal regimes is to maximize compensation to host governments, while maintaining the investor’s incentives to undertake exploration and extraction, given their respective risk profiles. While an objectively ‘fair’ division of resource rents remains contentious, international norms have developed over time. Regimes typically comprise a combination of production and profit-based instruments⁴⁵ to make up a combined ‘resource charge’, and thus involve an inherent trade-off between the efficiency and neutrality of the regime, as well as the timing and risk associated with revenues.

One could conceive of a similar approach to the taxation of value from user data. The design of any data-specific fiscal regime or resource charge (perhaps more appropriately an ‘access charge’, depending on whether the individual or government retains data ownership) must appropriately balance a sufficient return to the investor with the need for a ‘fair’ level of government revenue as compensation for extraction or access to the national data asset. Given the range of companies involved in the data economy and the variability in their profitability (Annex I), a degree of progressivity may be desirable, in order to capture large rents if they arise. It may also be desirable to ensure a minimum charge for all data collection activity regardless of rents, which governments would need to moderate to avoid deterring the development and growth of data-intensive companies—like natural resource companies, a high degree of risk typically characterizes the initial start-up phase, particularly given the high fixed (and sunk) costs incurred for data collection and analysis systems to be developed.

While there are many possible alternative tax instruments—or combinations of instruments—that can compensate countries for the collection and use of personal data, the focus here will be on the design of a production-based instrument, that is, a royalty on data collection. Annex IV highlights additional alternatives for taxing user value, drawn from the experiences of the extractive industries.

Designing a Royalty on User-Generated Value

Royalties are payments that companies must make to governments for permission to engage in certain activities. They are commonly charged for the right to use intellectual property, such as

⁴⁵ Production-based instruments, such as royalties, despite their regressivity, are often used by governments to secure revenues from the outset of production and to protect against profit shifting. And recognizing the larger rents generated by the resource industries, the overall level of taxation in the extractive industries is often higher than for other sectors, with a component of progressivity, through a resource rent tax instrument, to allow the capture of a larger share of rents from more profitable projects.

copyrights, patents, and trademarks, and in the extractive industries for the extraction of natural resources, and typically complement corporate income taxes. Royalties are also a useful—if nonetheless imperfect—substitute when direct taxation of rents is difficult, particularly for sectors heavily reliant on hard-to-value assets, and where administrative capacity is weak, and where rent taxation is therefore vulnerable to cost-based profit shifting (Boadway and Keen, 2015). Furthermore, by relying on revenues, they are simpler to administer than profit-based taxes, reducing the need to monitor costs. Finally, royalties sidestep the practical legal challenges associated with adjusting direct income taxes, since they do not require modification of existing permanent establishment rules or changes to income tax treaties.

Their application as a charge for the use of consumer data is therefore logical if not also somewhat ironic, since intra-company royalties are already used by multinational enterprises themselves to shift profits across jurisdictions. In the natural resource sectors, they have proven attractive to governments on the grounds that they secure some revenues as soon as production begins. Indeed, IMF advice to resource-rich member countries, particularly low-income countries, has been to charge a modest royalty alongside the statutory corporate income tax, with an additional rent-capture mechanism for particularly profitable projects (IMF, 2012).

In terms of design, a broadly-applicable royalty is likely to be desirable given the wide range of digitalized businesses collecting personal data. As the range of digital services continues to expand, it is important to prevent the proliferation of multiple royalty rates and bases across countries and activities which can generate both inefficiency and non-neutrality. This will also simplify administration and limit the scope for (purposefully) misclassifying taxable activities. Moreover, as we will show later in this section, under certain simplifying conditions, if all countries apply a consistent approach to determining user-based royalties, this would be broadly equivalent—in revenue terms—to a system of user-based formulary apportionment of profits.

There are a number of options for the design of the royalty base. A simple ad-valorem royalty based on the value of the flow of data collected from a country and used by a company in a given year would be the ideal design—this is the most common specification used in the extractives sector. Alternatively, if the firm retains ownership over the data, rather than accessing it on a use basis (as discussed in Section III), countries may wish to tax the stock of data held on a periodic basis, justified by the fact that companies are repeatedly generating value from this data.⁴⁶ However, both methods require both/either standardized data valuation methods and/or the establishment of a spot market for data.

In the absence of clear valuation methods, as long as the volume of data (stock or flow) collected from a country can be measured, a simpler approach would be to charge a specific royalty on this base. This can take the form of a defined volume-based charge on a unit of data collection,

⁴⁶ The stock of user data could also then be reported as a special sub-category of intangible assets on firm's balance sheets in the same way that petroleum and mineral reserves are measured, valued, and "booked".

such as a pre-specified monetary charge per terabyte. This approach is often used for bulk, low-value minerals such as aggregate and sand. However, it would require some careful design and monitoring by governments to ensure that the tax is periodically adjusted to reflect evolving data compression technologies.

Without valuation methods and volume measurement capabilities, an alternative two-step approximation for user-generated value can be considered. The first step would be to estimate the portion of a company's final revenues from digital services that were generated by a particular country's users. Once these country-specific revenues have been determined, the second step is to allow for a (standardized) netback deduction from these country-specific revenues, to account for value added from post-data collection processing and analysis.⁴⁷ These steps provide a proxy for the value of a country's user data, which can then serve as the base of the royalty. Indeed, in the extractive industries, countries often simplify valuation by using internationally-quoted benchmark prices for finished minerals, restricting netback costs to those that are easy to measure, or standardizing allowable deductions in contracts or legislation.

The first step requires a method for apportioning a company's user-generated revenues by location to approximate the relative value of the user base in different countries. However, this can be difficult because as explored in Section II, data is unlike other physical commodities, which can be traced from their point of extraction to their point of use. Moreover, its nonrival nature means that the same portion of data may be blended, processed, and used simultaneously in the production of multiple goods and services—in some cases even many years after it has been collected. Section III reviewed some of the country characteristics that can be used to inform such apportionment, for example, population, purchasing power, and sales revenue (in the case of online retailers).

Without coordination amongst countries, there is a risk that revenue attribution methods may vary within and across both countries and the digital services being targeted, introducing the opportunity for multiple (inconsistent) approaches. For example, the apportionment method for advertising revenues may differ from that used for user data sales, online sales of goods, and intermediation revenues. Even within certain activities, different keys could be used by different countries (e.g., value-based versus volume-based keys). Further complications might arise from competing claims over the revenues from cross-border transactions and sales of multinational data sets.

For the second step, the netback deduction would serve as an approximation to derive a value for the underlying personal data. This could be defined company-by-company—given different data refinement processes and cost structures—or in legislation at broader (sub)industry levels to ease administration. A case could be made for standardization of this netback across countries,

⁴⁷ For those businesses which also engage in other "less digital" activities, it would be necessary to determine the portion of overall revenues that are attributable to their digital activities.

assuming that multinationals are collecting data of similar quality from users worldwide and centralizing their processing operations, implying a common cost structure.

Alongside the royalty base, the choice of the rate is also important. The netback deduction and royalty rate are two sides of the same coin, since a country can calibrate the effective tax burden by adjusting either the netback or the rate of the royalty. In the extractive industries, for example, some countries disregard costs altogether in defining their royalty base, instead valuing output at the benchmark price for its mineral content and lowering the royalty rate to compensate.

Rates should be set at an appropriately modest level, as they are applied to revenues rather than profits.⁴⁸ Where royalties are charged on a gross—rather than a net—basis, they no longer only tax pure economic rents and can distort the activities they are targeting.⁴⁹ This is analogous to the disincentive effects of royalties on exploration activity in the extractive industries. Thus, those countries with lower value consumer markets (e.g., with fewer active users or lower purchasing power) might set rates lower so as not to disincentivize data extraction by nonresident digitalized businesses or deter market entry altogether.

In setting the rate, policymakers should also be sensitive to the risks of excessive pass-through to consumers. While the location-specific nature of the asset means that companies cannot themselves relocate to avoid payment of the tax, their relative market power may allow them to pass the tax on to consumers. This is likely much easier than in the resource sectors where for most countries commodity prices in export markets are exogenously determined.

At the same time, this risk should not be overstated. If the marginal cost of providing the taxed service is low, then the royalty acts like a tax on the firm's quasi-rents: rents that are exclusive of costs sunk in establishing the business (IMF, 2019). The primary impact may therefore not be on current pricing but on future investment. However, if the digital service is itself used as a business input, then the royalty may introduce production inefficiencies. This would reduce profitability for businesses and may raise prices for consumer, though the magnitude of such inefficiencies are unclear.

Cui and Hashimzade (2019) show that when the marginal cost is non-zero, the incidence of a tax on platform revenue will fall on both the platform and the advertisers/producers, but the effect on consumers is ambiguous. Moreover, as the authors argue, countries may well view some cost-

⁴⁸ For example, a royalty of 4 percent is the equivalent to 20 percent corporate income tax rate assuming a 20 percent average profit margin across all businesses, but the effective income tax burden increases as the profit margin declines. Using average profit margins means that royalties might be too high for low-profit or loss-making businesses.

⁴⁹ A tax on pure economic rents does not distort the mix of inputs used in production. At the margin, firms employ factors of production (capital, labor, etc.) until the marginal return on the additional unit equals its marginal cost. In economic terms, rents are zero at the margin, negative if production is too great, and positive if too little. A pure rent-based tax, therefore, neither discourages nor encourages investment or production, as it will not influence production decisions at the margin (Mintz and Chen, 2010).

passthrough to domestic users as a reasonable price to pay for capturing some of the platform rent. However, incidence effects are complex in two-sided markets. Firms may aim to shift some burden to the untaxed side: a tax on advertising creates an incentive to raise the price charged (or reduce the subsidy provided) to users; the price of advertising services may even fall. On tax incidence in two-sided-markets, see Bourreau and others (2016) and Kind and others (2008 and 2010).

Businesses at different points in their life cycle might require different tax treatment. For this reason, a case could be made to introduce thresholds and rates that vary by the size of a business. Safe harbor rules could also be used to protect small or loss-making companies. However, such provisions might quickly become nonbinding even for small digitalized businesses given the nature of their cost structure (Annex I). With low (or falling) marginal costs, average variable costs will also be low, allowing small businesses to scale up operations profitably and quickly.⁵⁰

User-based royalties are a powerful fiscal instrument with a long history of application in a sector that shares a number of characteristics with data-intensive digitalized business models. However, they should be carefully approached so as not to generate other economic distortions. If royalties are intended as a substitute rather than a complement to the corporate income tax, then a lack of multilateral consensus risks unwanted international double taxation if they are not creditable against corporate income tax payable in home jurisdictions. If applied unilaterally such tax measures may also risk retaliation, especially if these measures end up being de facto targeted on firms from a few countries (Hufbauer and Lu, 2018).

The Implications of Moving Towards a Royalty on User-Based Revenues

In the absence of multilateral consensus, Box 1 explores—in a highly stylized setting—what the noncooperative outcome could be if all countries were to impose user-based royalties on the revenues from digital services. It illustrates that, *ceteris paribus*, countries will be indifferent (in terms of tax revenues) between a user-apportioned profit tax and a royalty on user-based revenues, if the ratio of the royalty rate and the profit tax rate applicable to the multinational enterprise is set in proportion to the company's global average profit margin. This result holds irrespective of the global distribution of profits or revenues—and, by implication, the global distribution of costs.

While this is a very simplified result, which abstracts from some important real-world considerations and complexities, we can get a sense that should several countries move to implement such (short-term) royalties on user-based sales, then under the specified condition, the system would gradually come close to a system under which global profits are apportioned by the same user-based sales. This result should be familiar as it is the same logic that is

⁵⁰ Indeed, as noted by Cui (2018), the variable costs of data capture through the operation of a search engine or a social media network and its subsequent storage and maintenance would seem largely negligible.

commonly applied for calibrating standard turnover taxes for simplified small business regimes. In these systems, tax rates on turnover are typically set to ensure that the liability for the average small business would be the same as that under the application of the corporate income tax on profits.⁵¹

Box 1. Digital User-based Royalties as a First Step on the Way to Formulary Apportionment

This box explores the outcome should all countries apply some sort of unilateral royalty on user-based revenues. In a static setting, we can consider the implications for two countries, A and B , which can either (i) unilaterally tax user-based revenues earned by a nonresident multinational enterprise for the provision of digital services, or (ii) apply a single corporate income tax rate to an agreed upon allocation—in this case based on user-based sales—of the multinational enterprise's globally consolidated profits. We want to derive the conditions under which tax revenues from the two systems will be the same for a country such that they will be indifferent between them.

We start with the following expressions for tax revenues in a country i from the application of a user-based royalty:

$$\tau_i^r R_i,$$

where τ_i^r is the royalty rate in country i applied to user-based revenues, R_i , earned by the nonresident highly-digitalized multinational enterprise in return for services provided to domestic users in country i .

Under user-based formulary apportionment of global profits, each country is assigned:

$$\tau_i^c \alpha_i \pi_G,$$

where $\alpha_i = \frac{R_i}{R_G}$ is country i 's share of total global user-derived revenues, and $\sum_{i \in \{A,B\}} \alpha_i = 1$; $R_G = \sum_{i \in \{A,B\}} R_i$; τ_i^c is the corporate income tax rate for country i ; and $\pi_G = \sum_{i \in \{A,B\}} \pi_i$ is the multinational's globally consolidated profits and $\pi_i = R_i - C_i$ is the profit generated in country i (but not necessarily booked there).

For each country we get the following under revenue neutrality of both tax systems:

$$\tau_i^c \alpha_i \pi_G = \tau_i^r R_i,$$

which, after substituting in for α_i , reduces to the following expression:

$$\frac{\tau_i^r}{\tau_i^c} = \frac{\pi_G}{R_G}.$$

What this highly stylized model shows is that for the two systems to deliver equal tax revenues for each country, the ratio of the two tax rates for each country i must equal the ratio of global profits to global revenues, that is, the global average profit margin. In other words, assuming all countries have introduced user-based royalties, a country can earn the same revenues as if all countries had agreed on a user-based split of the multinational enterprise's globally consolidated profits, if and only if the ratio of the corporate income tax rate to the royalty rate is the same for all countries.

⁵¹ Just as in the small business setting, a turnover tax calibrated using average profit margins would be too high for low-profit or loss-making digitalized businesses (and vice versa), disincentivizing investment.

To take the logic one step further, given that user location and destination coincide, the widespread application of a royalty on user-based sales, when combined with certain forms of investment expensing can even lead us eventually to a destination-based cash-flow tax. Furthermore, user-based (or destination-based) approaches can be applied to any company engaged in digital activity, rather than only a subset of highly-digitalized companies.

As this section has discussed, there are several reasons why policymakers should not preclude the use of a user-based royalty tax instrument as a complementary measure or as part of a globally cooperative approach to tax data-intensive services. Firstly, royalty payments are common between private parties for the right to use intellectual property and other intangible assets, such as copyrights, patents, and trademarks. This sets a natural precedent for governments to charge similar payments for the use of a national (intangible) asset—such as a user data—by digitalized businesses. Secondly, as noted earlier, royalty taxes are often a necessary substitute when the direct taxation of rents is difficult, for example, in the resource sectors. Indeed, a royalty instrument is less vulnerable to profit shifting, particularly in a sector heavily reliant on hard-to-value intangibles. Thirdly, given the clear practical and political challenges of reforming income taxes to account for user value, well-designed user-based royalty instruments—which can also allow for some sort of netback to account for data processing—may provide a feasible and more realistic option. If designed and applied comprehensively and coherently to all services that use data as an input (i.e., little or no ringfencing around specific digital services), they could provide a valuable alternative or complement to the corporate income tax.

Some recent proposals for turnover taxes on digital services already take on the flavor of a user-based royalty. These include the digital services tax proposed by the European Commission, and variants subsequently proposed or enacted unilaterally by individual member states (Box 2). This formulation of digital services tax should be distinguished from non-user-based equalization levies on payments for digital advertising services. This type of levy was introduced by India in 2016 taking the form of a withholding tax on payments to nonresidents for certain digital services (Box 3). It has subsequently been expanded in scope in 2020 to a user-based turnover tax targeted only at nonresident businesses. Both types of tax attempt to target digital services provided by businesses operating remotely within a jurisdiction. They have also been formulated to sidestep income tax treaty issues by basing taxes on gross income (i.e., sales/turnover) rather than net income (i.e., profits)—for instance, as an excise tax on the supply of digital services or a tariff to protect domestic service providers.⁵²

⁵² The OECD in its 2018 Interim Report provides guidance on the legal design of an excise tax on e-services, to ensure that they do not fall within the scope of income tax treaties. The case would be stronger where such an excise is (i) levied on the supply of a certain defined category or categories of e-services and imposed on the parties to the supply without reference to the particular economic or tax position of the supplier; (ii) charged at a fixed rate, calculated by reference to the consideration paid for those services (without reference to the net

Box 2. User-Based Turnover Tax: The European Commission Proposal

The 2018 European Commission draft directive is the most prominent example of a user-based turnover tax. It proposes a 3 percent levy on gross income of (resident and nonresident) businesses that supply specified digital services to domestic consumers and businesses. The tax is applied to a portion of revenues deemed to be derived from domestic users.

The tax is payable by large digitalized businesses, defined according to global and local thresholds. The thresholds are designed to ensure that only those dominant large businesses that benefit substantially from the exploitation of big data and network effects will be captured, while insulating small technology startups. Furthermore, the opportunity to engage in aggressive tax planning typically lies with larger companies. However, the global gross income thresholds inevitably restrict the companies liable to a handful of large tech firms and has sparked claims by the United States, where the majority of these companies reside, that the tax discriminates against foreign businesses. Large highly-digitalized multinational enterprises operating in other countries, such as China, with may also fall into the scope of this royalty (as they expand into European markets), leading to similar claims.

Only certain activities are included within the scope of the European Commission's proposal (online advertising, intermediation services, and the sale of data), while other digital activities, such as online retail sales, financial and payment services, and businesses collecting and using data for their own internal purposes, are excluded. The rationale for this exclusion is that although online retail, digital content provision, and online services might also allow some degree of user interaction, such interaction is ancillary to the main purpose of the delivery of goods, content and services. That is, "value creation" in such cases lies mainly with the production of the goods, content, and services sold online, while the user's role in value creation is less central. However, since many digital platforms engage in both in and out of scope activities (e.g., platforms that provide online retail, digital content provision and user intermediation services), the European Commission's tax proposal would require the separation of revenue from taxable and non-taxable services.

In terms of revenue attribution, the European Commission proposal takes a volume-based approach, which circumvents the valuation issue. Revenue is allocated to member countries in proportion to the number of times an advertisement has appeared on users' devices (in the case of advertising) and the number of users that have concluded transactions on a particular platform in a given tax period (for intermediation services), where the location of the user is determined based on their internet protocol or IP address. Questions remain as to how the residency of the user would determine the apportionment of revenues in the case of cross-border transactions, and how to apportion revenue derived from the sale of multinational data sets. At present, no 'netback deduction' for value added from post-data collection processing has been factored into the tax design, but may have factored in the choice of the tax rate.

Some EU states (e.g., Austria, Czech Republic, France, Italy, Spain, and the United Kingdom) have moved ahead with unilateral measures—though each have calibrated the tax differently, for example, with different rates and local (national) thresholds (see Table 2.1 for a list of those countries that have proposed/legislated/implemented digital services taxes). In many cases, the approach used to apportion revenues also deviates from the original European Commission proposal. For example, the United Kingdom's approach is to account for user value through an indirect destination-based proxy: the value of the advertisements and search results targeted at domestic users and, in the case of online marketplaces, the commissions generated from transactions intermediated between domestic users (i.e., from both sides of the transaction).

income of the supplier or the income from the supply); and (iii) not creditable or eligible for any other type of relief against income tax imposed on the same payment.

Box 2. User-Based Turnover Tax: The European Commission Proposal (continued)

Box Table 2.1. Examples of Country-Specific User-based Turnover Taxes

Country/Polity	Key dates	Details
European Commission	Mar 21, 2018; Draft directive	3 percent; dual thresholds: > EUR 750 million (global); > EUR 50 million (local, EU-wide); Online advertising, digital intermediation services, sale of user data; portion of annual worldwide revenues attributable to domestic users. ⁵³
Austria	Apr 5, 2019 (draft bill "Digitalsteuergesetz 2020"); to be implemented Jan 1, 2020	5 percent; dual thresholds: > EUR 750 million (global); > EUR 25 million (local); Online advertising (provision and contribution) only.
Czech Republic	Nov 19, 2019 (pending Parliamentary approval)	7 percent; dual thresholds: > EUR 750 million (global); > CZK 100 million (local, approx. EUR 2 million); Online advertising, digital intermediation services, sale of user data.
France 1/	Jan 25, 2019 (Draft Law No. 121/000039); Jul 11, 2019 (National assembly approval); Jul 11, 2019 (Senate approval)	3 percent; dual thresholds: > EUR 750 million (global); > EUR 25 million (local); Online advertising, digital intermediation services, sale of user data.
Italy 2/	Jan 1, 2020 (Law no.145/2018; Law no. 160/2019)	3 percent; dual thresholds: > EUR 750 million (global); > EUR 5.5 million (local); Online advertising, digital intermediation services, sale of user data.
Spain	Jan 25, 2019 (Draft Law No. 121/000039); Feb 18, 2020 (Parliamentary approval)	3 percent; dual thresholds: > EUR 750 million (global); > EUR 3 million (local); Online advertising, digital intermediation services, sale of user data; Payments based on IP address of device used.
United Kingdom 3/	Apr 6, 2020 (Finance Bill 2019/20)	2 percent; 0 percent (loss-making companies); single threshold: > GBP 500 million (global). Safe harbor provisions for loss-makers and businesses with low margins. Annual GBP 25 million tax-free threshold; digital intermediation services (online marketplaces, search engines, and social media platforms).

Sources: National authorities.

1/ DST originally expected to apply retroactively from Jan. 1, 2019. Final text of legislation included provision that for the 2019 tax year, the share of services connected with France will be assessed during the period between the day following the publication of the Act and Dec 31, 2019. However, following talks with the U.S., France will not collect revenue until end-2020.

2/ Italy introduced a 3 percent web tax law, effective as of January 1, 2020, established by the 2020 Budget Law (Law no. 160 of 2019) and 2019 Budget Law (Law no. 145 of 2018).

3/ Revenue allocation in proportion to (i) for social media platforms, revenues from targeting adverts at UK users, (ii) for search engines, revenues from displaying advertising against the result of key search terms inputted by UK users; (iii) for online marketplaces, commissions generated by facilitating a transaction between UK users.

⁵³ Revenue allocation in proportion to (i) the number of times an advertisement has appeared on EU users' devices; (ii) the number of EU users having concluded underlying transactions on a digital interface, with user location to be determined based on Internet Protocol (IP) addresses.

Box 2. User-Based Turnover Tax: The European Commission Proposal (concluded)

While it may be too early to evaluate these measures, so far, the revenue from such instruments that have been costed and included in national budgets appear to be relatively low, suggesting that the yields—as well as the perceived cost to highly-digitalized businesses—may be overstated (Table 2.2). As such, these measures may have some political appeal for remedying, without significant commercial impact, the popular perception that the government receives little tax from firms that feature so prominently in the daily lives of consumers (IMF, 2019).

Box Table 2.2. Revenue Estimates from Proposed Digital Services Taxes 1/

	2019	2020	2021	2022	2023
	(Local Currency Units, millions)				
Austria	.	25	28	31	34
France	.	500	...	...	...
Italy	150	600	600	...	...
Spain	1,200	...	...	...	...
United Kingdom	5	275	370	400	440
	(Percent of GDP)				
Austria	.	0.006	0.007	0.007	0.007
France	.	0.020	...	...	...
Italy	0.008	0.033	0.033	...	...
Spain	0.096	...	...	...	...
United Kingdom	0.000	0.012	0.016	0.017	0.018

Sources: National authorities.

1/ Estimates for the revenue yields vary from country to country given differences in design and structural characteristics of each market. For example, the Indian equalization levy, introduced in 2016, amounted to INR 7 billion in FY 2017/18 (<0.01 of GDP). The European Commission has estimated annual revenue yield from its digital service tax for member states of EUR 5 billion (<0.01 percent of EU GDP).

Box 3. Withholding Taxes on Payments to Nonresidents: India's 2016 Equalization Levy

In 2016, India introduced an equalization levy in the form of a withholding tax on payments by domestic businesses to non-resident entities for online advertising services, at a rate of 6 percent. In March 2020, the levy was expanded to include income received by nonresident businesses for the supply of all e-commerce supply or services at a rate of 2 percent.

The first incarnation of the levy bears a close resemblance to the sorts of final withholding taxes already commonly applied to cross-border technical services (for example, accounting, management, and subcontractor services). For this version of the levy, the burden of compliance was placed on the domestic recipient of services.

Since payments to nonresidents for the provision of digital services abroad would otherwise go untaxed in the destination country, the levy attempted to equalize their (income tax) treatment vis-a-vis resident service providers. Indeed, to the extent that the levy reduces any tax-induced comparative advantage that foreign suppliers may enjoy over domestic suppliers, equalizing the tax treatment could also ease production inefficiencies.

**Box 3. Withholding Taxes on Payments to Nonresidents: India's 2016 Equalization Levy
(continued)**

Thus, the objective of these taxes is not to capture a portion of user value—while payable in the country of the purchaser of such services, the tax base may not in fact reflect the location of the users being targeted by such services (for example, in the case of an Indian retailer advertising products or services outside of India), and equally would not capture payments by the nonresident provider to companies in other (e.g., neighboring) countries, which are targeting Indian users.

Moreover, while simpler to design and administer, such taxes can potentially be more easily avoided by setting up appropriate structures. For example, if the resident company sets up an offshore related entity to make the payments to the nonresident supplier, it could be possible to avoid these withholding taxes.

Several other countries have also introduced variants of this tax. Thresholds have also been introduced to reduce the burden of this tax on small businesses. In Chile, Hungary, and Turkey, only payments for digital advertising service have been targeted. Tax rates also vary substantially from 6 percent in India to 15 percent in Turkey (see Box Table 3.1).

As of March 2020, the second incarnation now displays the hallmarks of the user-based turnover tax from the EU proposal, but only payable by nonresident businesses, creating a discriminatory tariff on foreign-supplied digital services. By expanding the remit of the levy, the government aims to use the tax system to capture a portion of the value created from digital services within the Indian economy. The e-commerce supplies covered include the sale of online goods and services (including through platforms) to any person who uses an Indian internet protocol address and to any nonresident who is purchasing advertising services targeted at Indian residents. Unlike the original levy on advertising, the resident business is no longer responsible for deducting and remitting the tax. Instead, the e-commerce operator is responsible for charging and paying.

Box Table 3.1. Details of Other Turnover Taxes on Digital Activities by Country.

Country	Details	
France 1/	Jan 1, 2018 (Decree No. 2017-1364; Sep 20, 2017)	2 percent; (10 percent for certain content) on revenues from French residents from sales and rentals of video storage media, videos on demand, and advertising and sponsorship revenues derived by paid-for or free online video sites. Tax free allowance of EUR 100,000 for provider of free online access to Audiovisual (AV) content, 4 percent allowance for advertising revenues, 66 percent allowance for EU platforms sharing content created by private users, and exemption for sites where AV content is not primary business.
Hungary 2/	Jul 1, 2017	7.5 percent; applies to advertising revenues that exceed HUF 100 million.
Turkey	Dec 19, 2018 (Presidential Decision No. 476); Feb 15, 2019 (Communiqué No. 17)	15 percent; Payments made to nonresident online advertising service providers or to those who act as an intermediary regarding the provision of advertising services through the internet. (Article 94 of the Individual Income Tax and Article 15 of Corporate Income Tax).
Chile	Proposal issued Aug 23, 2018	10 percent; Nonresident companies. Withheld by payment intermediaries. Digital brokering, advertising, entertainment, intermediation and storage services. Revenues received from Chilean consumers (B2C).

**Box 3. Withholding Taxes on Payments to Nonresidents: India’s 2016 Equalization Levy
(concluded)**

Box Table 3.1. Details of Other Turnover Taxes on Digital Activities by Country (Concluded)

India	Jun 1, 2016 (Finance Act 2016, Chapter VIII) Apr 1, 2020 (Finance Act 2020)	6 percent; Aggregate payments to nonresident >INR 100,000 (approx. US\$ 1500) in a financial year. Nonresident companies. Withheld by payor. Online advertising purchased by Indian buyers. Revenues received from Indian residents or Indian PEs of nonresidents. 2 percent; Gross receipts in respect of goods sold/services provided to residents, non-residents and persons using IP addresses in India <INR 20 million. Charged and paid by nonresident e-commerce platform operators.
Uruguay 3/	Jan 1, 2018 (Law 19.535; Resolution 6,409/2018)	12 percent; In the case of intermediation services, the tax base will be 50 percent of the transaction if only one of the parties is based in Uruguay. Nonresident. AV services and digital mediation or intermediation services. Revenues received from Uruguayan residents (Uruguay-based IP address or user billing address).

Sources: National authorities.

1/ Germany has a similar tax with proceeds earmarked for the promotion of national cinema.

2/ In August 2014, the Hungarian parliament passed a bill on a new type of tax on advertising published in Hungary. The tax is to be paid by media content providers settled in Hungary and includes online advertising activities. The tax is income based: a yearly income from advertising activity over HUF 100 million was initially to be taxed at the rate of 5.3 percent. The EC determined (Nov 4, 2016) that the rate structure violated rules on state aid because the lower rates were preferential to some companies.

3/ Constitutes an expanded scope of the existing nonresident income tax on Uruguayan-sourced income. Similar rules apply to the extended scope of the VAT.

B. Value Added Tax

The focus up until now has been on how to modify existing income tax rules to accommodate the taxation of remote digital services, as well as the design of complementary/substitute taxes. Regardless of the consensus over the role of user-generated value for profit taxation, it is also important to consider consumption taxes (notably VATs). Since consumption taxes largely follow the destination principle, all imported and locally consumed goods and services need to be included to ensure the neutral treatment of cross-border trade. Therefore, at the minimum, all digital (e-commerce) transactions need to be folded into existing consumption tax regimes—alongside existing “non-digital” transactions—to ensure the neutrality of these taxes.

Most countries that operate VATs require domestic businesses that sell online directly to resident consumers to register (if above the requisite annual thresholds) and charge VAT/GST on their sales. Local sellers of goods and services that use digital platforms to access consumers are similarly required to register and remit VAT should their sales turnover meet the necessary requirements. In many countries, digital platforms are also required to charge VAT/GST on the

commission for the services they intermediate.⁵⁴ However, nonresident companies that sell remotely into the domestic market, either directly or through platforms, are not always covered under domestic consumption tax legislation. The inclusion of these transactions is an obvious and important extension of existing regimes. Figure 4 illustrates the combination of services and supplier residencies that existing VATs have covered up until very recently, as well as where new recent measures fall (highlighted).

In response, countries are looking to complete the coverage of their domestic indirect tax systems (for example, VAT/GSTs), by extending them to cover the provision of digital services by nonresident entities. Such changes typically cover either or both remote digital services such as video/audio streaming and downloads (EU 2018 VAT e-commerce package, New Zealand, Norway, Australia, Uruguay), as well as imports of goods facilitated by digital platforms (Australia, Singapore, Vietnam, United Kingdom, Germany).

Figure 4. Coverage of Current Taxes Based on Types of Services and Residency of Supplier

	“Digital” Services	Goods and “Nondigital” Services
Nonresident providers	VAT WHT on Payments to Nonresidents User-based Turnover Taxes	VAT
Resident providers	VAT User-based Turnover Taxes	VAT

Note: WHT=withholding tax

This principle is included in the OECD’s VAT/GST Guidelines, which also contain guidance on how destination countries can exercise their taxing rights over cross-border sales to their citizens. The general consensus is that a “vendor registration model” is preferable (meaning that the offshore supplier should register and pay VAT in the country of consumption) supported by an electronic filing and payment mechanism. In some cases, a tax collection role may be assigned to the platforms through which relevant sales are made. For example, under the “full liability regime”,

⁵⁴ However, the jurisdiction to which the VAT on commission is owed could vary. Where the buyer and seller of a service—both of whom are users of the digital intermediation service—are in the same country, VAT can be clearly remitted to that location. Where the buyer and seller are in different jurisdictions, there might be a split between the buyer and seller locations. Uruguay has specified that only 50 percent of the commission would be taxed if only one user is identified as Uruguayan. An additional complication might arise if user location is determined by the IP address at the time of the transaction. In this case, what happens if one/both users are traveling outside of their (habitually) residence countries, i.e., which countries get the revenue (or not)?

the digital platform is fully and solely liable for assessing, collecting and remitting the VAT/GST due on the online sales it facilitates.⁵⁵

VAT and the “Free” Digital Barter

The identification of data collection as a taxable event raises the question of whether the ‘digital barter’—the transaction discussed in Section II through which data is collected—like regular barter should also be subject to VAT. In other words, should so-called “free” services (such as those provided by search engines or social media platforms), which amount to barter transactions—because users in fact “pay” for these services with their user data—be subject to VAT?

In the case of a business-to-business barter transaction which involves the supply of goods or services and the receipt of goods or services in payment, the two components of the transaction are typically considered as separate supplies on which VAT must be calculated, assuming both parties are registered for VAT. In the case of a cross-border barter where both parties are VAT-registered, no revenue would be expected to arise, particularly after the VAT-registered recipient claimed a credit for the VAT paid. However, if the VAT-registered parties were each in turn making exempt or partially exempt supplies (such that the VAT paid could not be fully reclaimed), then there is potentially revenue for one or both countries, as each would continue to be “destinations” for one of the supplies without a full corresponding credit. However, in the case of a business-to-consumer barter transaction—more common in the case of search and social media—consumers would not typically be VAT-registered, and as such only the digitalized business would have to pay VAT on the “valuable” service.

Moreover, there are questions over whether the business-to-consumer transaction constitutes a taxable barter in the first place. There is arguably no sufficiently direct link between the service provided and the non-monetary consideration received, given the universal access of the service or platform to users and the fact that the data collected varies from one user to another, with it even possible for a user to provide false data. Further, users are not attempting to use their data on a continued basis to derive income more generally—if given the opportunity to pay with traditional monetary means, they might agree or prefer to do so.

In any case, it would seem that applying VAT to “free” digital services raises the same complications as for the corporate income tax, in particular the need to value the non-monetary consideration (i.e. the user data) on a per-transaction basis. Attempting to evaluate both legs of the barter for the purposes of VAT seems unwieldy given the problems identified earlier of determining a value for data as well as the digital service provided—for taxing as well as crediting purposes—with both likely to fluctuate with demand and supply.

⁵⁵ The implementation of full liability regime is likely to require coordination between and changes to the tax administration and business systems to ensure effective compliance.

C. The Dangers of Ringfencing the Digital Economy

Regardless of the fiscal instrument selected, this paper has consistently pointed out the importance of its general application to all types of businesses in the economy, with little or no ringfencing. With digitalization pervasive across the entire economy, it is both impractical and economically undesirable to single out “more digital” or “less digital” businesses or identify a “digital economy”. As such, attempts to design policies specific to a so-called “digital economy” are potentially flawed—it is generally better for policy makers to ignore the distinction and take a holistic approach, particularly when it comes to areas such as international taxation. This was the view put forward in the 2014 report from the expert group on taxation of the digital economy convened by the European Commission (European Commission, 2014), which noted that there should be no special tax regime for more digitalized companies. Rather, general rules should be applied or adapted so that there is equal treatment for all businesses. The OECD (2015) also suggested that countries should not attempt to ringfence particular companies or business models for special tax treatment, noting that “the digital economy is increasingly becoming the economy itself”.

Nevertheless, as noted above, a more targeted and discriminatory approach has gained significant traction in recent years and is set to be implemented unilaterally by some members of the European Union. These measures not only target digitalized businesses, but also isolate both a particular size of business and subset of digital activities. A case could be made that some degree of early ringfencing could be helpful in the (very) short run as tax measures are tested and adapted. However, more generally, from the point of view of efficiency and neutrality, establishing a parallel tax regime for digital services and other digitalized business models would drive an inefficient wedge between the digital and the non-digital sectors of the overall economy. Moreover, poorly-designed and uncoordinated measures run the risk of becoming entrenched.

V. CONCLUSION

Digitalization—as a general-purpose technology—has unlocked the ability for businesses to collect vast amounts of data about agents in the economy from all manner of business-to-business and business-to-consumer transactions, including the so-called digital barter. By combining it with other nonrival, excludable intangible goods—such as intellectual property and knowhow—businesses have been able to design and remotely provide new and existing products and services at low marginal costs, fostering the emergence of large near-monopolistic and oligopolistic markets.

As businesses in almost every sector take advantage of the benefits of digitalization, the need to address the shortcomings and unresolved issues within the international corporate income tax and VAT systems has become that much more urgent. The current system of arm’s length pricing and the growing importance of near-impossible-to-value intangibles—including user data—has allowed opportunities for corporate income tax avoidance to proliferate. As a result, many

countries are seeing profits shifted out of their reach by companies using transfer pricing tactics, while those without any permanent establishment-based taxing right are missing out on the opportunity to tax these companies altogether.

As a result, the contribution of user data to the profitability of highly-digitalized businesses has become a rallying point for governments seeking to redress the perception of an unfair distribution of profits and taxing rights. A number of policy proposals have been put forward which seek to limit the scope of tax avoidance and tax competition, by attempting to pre-determine a distribution of taxable profits across countries. Many of these proposed rules for splitting income are predicated, whether implicitly or explicitly, on the idea that the user of a digital service has a role to play in “value creation” and which, if necessary, cede source-based taxing rights to the jurisdictions where they are located.

And indeed, as this paper has argued, a plausible case can be made to tax this value generated by users under the corporate income tax. It seems reasonable to acknowledge that raw user data must have some underlying value prior to processing, just as any primary commodity has some value before it is transformed into a final product, for example, crude oil or timber. However, governments remain divided over its importance and the resulting implications for the distribution of profits worldwide. Should governments eventually recognise and agree on the importance of user data—and if the valuation of such data can become standardized along certain key dimensions/uses—its role in providing a basis for corporate taxation could help to remedy some of the shortcomings of the international tax system.

In practical terms, the first obstacle to overcome is the assignment of taxing rights to data-producing (user/market) countries through revised nexus rules (e.g., a new permanent establishment concept). The second challenge is to design revised profit allocation rules which reflect user contribution. Most notably, there are no available market-based prices or established benchmarks to guide how user data should be measured and valued, preventing governments from being able to quantify the importance of user data to production. In other words, the issue of user data has added to the scale of the existing valuation issues posed by intangible assets, while also expanding the potential number of countries claiming the right to tax. Both issues are heavily politicized and influenced by countries jockeying for position.

One of the cleaner solutions is rooted in the idea of formulary apportionment which reflects the user as a factor. Cleaner because it helps diminish the opportunities for profit shifting that exist under the current system of arm’s length pricing. However, while some countries could gain—for example, large populous economies and those with greater purchasing power—others could lose in this shift towards a sales-based system. The formula can also be modified to accommodate (original) source economies, where these multinational enterprises—digitalized or otherwise—developed. Of course, international agreement on any formula is also likely to be fraught.

There are a number of possible solutions that fall between the old and the new. The new family of solutions go halfway towards full-blown formulary apportionment, while retaining elements of

the existing arm's length pricing. Two such related proposals gaining traction are those of marketing intangibles and residual profit allocation. Both approaches acknowledge the rights of—and reallocation of income to—market jurisdictions, while preserving the rights and tax bases of current source-based jurisdictions.

Other instruments are available to governments seeking compensation for the use of their citizens' personal data. Such measures can either substitute (in the short term) or complement existing taxes, such as the corporate income tax. One example is a royalty on the value of user data, proxied by revenues from digital services until a market for data develops. These revenues could also be adjusted to account for a highly digitalized business' value added from the processing of data using some form of netback deduction. Indeed, while multilateral consensus should remain the endgame, this paper has also highlighted that under simplifying assumptions, where all countries calibrate their tax systems to global profit margins, unilateral adoption of user-based royalties could lead to an outcome where countries are indifferent between these taxes or user-based formulary apportionment. In other words, under these specific circumstances, the gradual and sequential implementation of user-based royalties could eventually bring the world towards a corporate taxation system apportioned by user-derived sales.

However, these measures are not without their potential pitfalls, particularly if uncoordinated. Possible drawbacks include the creation of undesirable disincentives for investment, and the proliferation of double taxation and excessive tax burdens due to multiple royalty rates and bases, administrative complexity, and the risk of misclassified activities. The resulting variation in effective tax rates across jurisdictions could have a tangible impact on global resource allocation—all in return for potentially very little tax revenue. There are also political economy costs of retaliation.

The absence of international consensus and a lack of clear data valuation methods have already pushed many countries to impose targeted turnover-based measures on varying subsets of digital services. In some cases, indirect proxies for user value are used as the tax base, for example, revenues from online advertising or from remote selling through online platforms, where the transaction value is observable. Other governments have side-stepped the valuation issue by basing their taxes on directly observable indicators, such as the volume of users. While these are all practical solutions, the risk remains that they do not sufficiently address the issue of taxing profits from "value created"—in this case by users. Furthermore, such an inconsistent approach could leave countries with a patchwork of overlapping measures that create more problems than they solve.

Moreover, with digitalization permeating all sectors of the economy, user data is being exploited at a scale large enough to be recognized as an economic input to production. It should therefore be recognized for all businesses that do so—even if with varying degrees of intensity and relevance—with little or no ringfencing of specific digital activities. Empirical data also does not conclusively suggest that highly-digitalized companies are particularly different (in terms of

profitability, intangible assets, and effective tax rates) from other large businesses—though it is important to note that the data is insufficient to definitively identify differences between companies and sectors.

What this paper attempts to highlight is not only the value of the user to highly-digitalized businesses but also that the user is likely to become increasingly important for all businesses going forward. Therefore, it would seem increasingly impossible—even negligent—to deny their role in providing a basis for taxing rights and the attribution of profits. For this reason, shifts in the international tax system to reflect their worth not only seem inevitable but also tec(h)tonic.

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Annex I. Characteristics of Highly-Digitalized Businesses

Information and communications technology (ICT)—and the “digitalization” it has enabled—is an example of a general-purpose technology that promotes economic activity well beyond the sector that supplies it, in the same way that electricity, internal combustion, and steam have done in the past (Jovanovic and Rousseau, 2005). It has given rise to new and growing information sub-sectors, such as cloud computing and big data analytics, characterized by high capital-to-labor ratios, given their small, highly-educated labor forces and a high degree of capital intensity (Autor and others, 2017). These new sectors are purportedly making significant contributions to productivity and have also resulted in an unprecedented increase in the flow of data both within and between countries, allowing businesses to improve production processes and extend their reach (OECD, 2018).⁵⁶

Manyika and others (2015) attempt to determine the relative degree of digitalization of industrial sectors in the U.S., using 27 factors grouped under three broad headings—digitalization of assets, usage, and labor. Using these categories, their approach ranks the ICT, media, professional services, and financial sectors as among the most digitalized on average. However, they also acknowledge that there are other sectors with relatively lower average levels of digitalization which nonetheless have “digital leaders”—for example, in hospitality, retail trade, and transportation. Such pockets of variation in the degree of digitalization within sectors makes it statistically difficult to use aggregated statistics to identify the performance and contribution of highly-digitalized businesses.⁵⁷ And furthermore, even for those well-known highly-digitalized multinational enterprises, the sort of granular (unconsolidated) details about their operations—which would allow us to determine effective tax rates by jurisdiction or supernormal profitability—are either unknown or confidential. Therefore, the combination of (i) a lack of standard categorization of businesses in terms of their “relative digitalization”, and (ii) the unavailability of micro-data on their operations—revenues, profits, investment—by jurisdiction, makes it harder to assess the characteristics of these businesses.

Despite the difficulties discussed in identifying the digital economy in absolute terms, it is still worthwhile to try and isolate those sectors in which relatively more digitalized businesses can be found, so as to establish whether or not they exhibit, on average, the characteristics that are commonly associated with them. To do so, it is important to consider two issues. The first is the choice of an appropriate cohort against which digitalized businesses can be compared. The second is the limitations imposed by the data available on multinational enterprises, which

⁵⁶ As a mark of the intensity of data flows and cloud processing, the annual compound growth rate of international internet bandwidth has averaged almost 40 percent between 2014 and 2018 (<https://blog.telegeography.com/international-internet-capacity-growth-just-accelerated-for-the-first-time-since-2015>).

⁵⁷ For example, in some databases Amazon has been classified under NAICS 2017 code 454110 (“Electronic Shopping and Mail-Order Houses”) and in others as code 4512 (“Book Stores and News Dealers”). However, the retail trade category includes other large retail businesses such as Home depot, Walgreens Boots Allianz, and Walmart, which also have a digital presence alongside large physical footprints.

typically has to be taken from globally-consolidated financial statements, given that data on subsidiaries and local affiliates is more limited and incomplete. For accounting reasons, these do not necessarily report performance measures in a way that can help definitively refute or corroborate the claims made about more digitalized multinational enterprises, e.g., tax liabilities. This is a common issue in the literature for multinational enterprises (Bilicka, 2019).

Therefore, for this exercise, publicly-available firm-level data was compiled—where available—for some of world’s largest multinational enterprises captured in the Fortune Global 500, which is a cohort of the world’s largest companies based on revenue.⁵⁸ Within this cohort, sectors with highly-digitalized multinational enterprises were then carved out and compared with businesses in other relatively less digitalized sectors to understand the dimensions along which more the former may or may not stand out.

Firms are aggregated by sector using the statistical classification of economic activities in the European Community (NACE revision 2). Two new sectors in which highly-digitalized multinational enterprises are active—and can be considered the “most digitalized”—were then created by grouping certain subcategories: “technology manufacturers” and “technology non-manufacturers” (Annex Table 1.1). The former contains those companies that are classified as manufacturers (e.g., of consumer electronics, semiconductors, etc.), and the latter those tech companies that are included in the ICT sectoral classification (software designers, etc.) and other digital-related subcomponents of the retail sector. In this way, the aim is to restrict the comparison between large multinational enterprises. While there can be variation even within sectors along certain dimensions (e.g., total assets, investment, profitability, etc.), size (as measured by revenue) is maintained as the key common identifier for the whole sample.

These sectoral classifications can be applied to annual data on the 500 most valuable publicly-listed companies since 1980 (Annex Figure 4). What we see is that in recent years, while firms in the selected technology-related sectors are not the most numerous, they have become the most valuable, overtaking firms in the banking and non-technology-related manufacturing sectors.

It is also worth acknowledging the impact that digitalization is having on the distribution of firm size in some sectors. Two-sided digital platforms are facilitating a rapid growth in small business activity, by reducing transaction costs and the minimum efficient scale for businesses. Using data from the U.S. Census Bureau, we are seeing this already in some sectors where peer-to-peer (small B2C or C2C) activity is coming to dominate service provision, e.g., transportation (Figure 5). As a result, this is driving a gradual polarization in the firm distribution towards either small- or large-sized businesses, medium-sized businesses are either being drowned out by the surge in small businesses or consolidating into larger ventures.

⁵⁸ Firm-level data was obtained from Bureau Van Dijk’s Orbis database. The Fortune Global 500 sample is supplemented by the 100 largest MNEs ranked by foreign assets reported in UNCTAD’s 2018 World Investment Report.

Annex Table I. Identifying Sectors Using the Statistical Classification of Economic Activities in the European Community with Highly-Digitalized Businesses

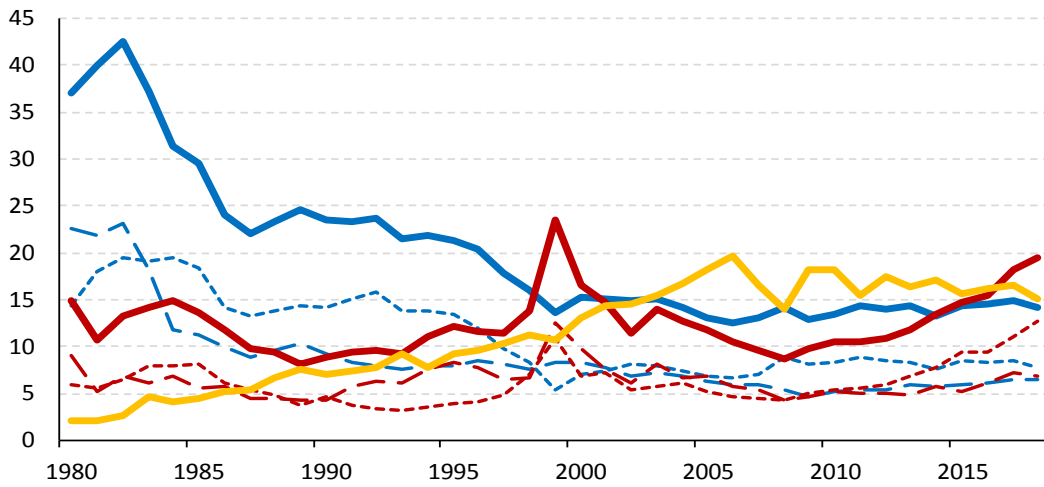
Sectors	Corresponding NACE codes
Agriculture, Forestry and Fishing	01, 02, 03, 04
Mining and Quarrying	05, 07, 08, 09
Oil and Gas	06, 19
Manufacturing: Basic Goods	10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25, 31, 32, 33
Manufacturing: Chemicals	20
Manufacturing: Pharmaceuticals	21
Technology (Manufacturing)	2611, 2612, 2620, 2630, 2640
Manufacturing: Advanced (non-tech)	2651, 2652, 2660, 2670, 2680, 27, 28, 30
Manufacturing, Wholesale and Retail Trade and Repair: Motor vehicles	29, 45
Electricity, Gas, Steam and Air Conditioning Supply	35
Water Supply; Sewerage, Waste Management and Remediation Activities	36, 37, 38, 39
Construction	41, 42, 43
Wholesale Trade (excl. Motor Vehicles and Motorcycles)	46
Retail trade	47 (excl. 4761, 4791)
Technology (Non-manufacturing)	4761, 4791, 5821, 5829, 62, 6311, 6312, 6399
Transportation and Storage (excl. Air)	49, 50, 52, 53
Transportation: Air	51
Hospitality (Accommodation)	55
Hospitality (Food Service Activities)	56
Media	58 (excl. 5821, 5829), 59, 60, 6391
Telecommunications	61
Banking	64
Insurance and other financial services	65, 66
Real Estate Activities	68
Professional, Scientific and Technical Activities	69, 70, 71, 72, 73, 74, 75
Administrative and Support Service Activities	77, 78, 79, 80, 81, 82
Government (Public Administration and Defence; Compulsory Social Security)	84
Education	85
Healthcare (Human Health and Social Work Activities)	86, 87, 88
Arts, Entertainment and Recreation	90, 91, 92, 93
Other Services 1/	94, 95, 96, 97, 98, 99

1/ Includes activities of households as employers; undifferentiated goods and services producing activities of households for own use; activities of extraterritorial organisations and bodies.

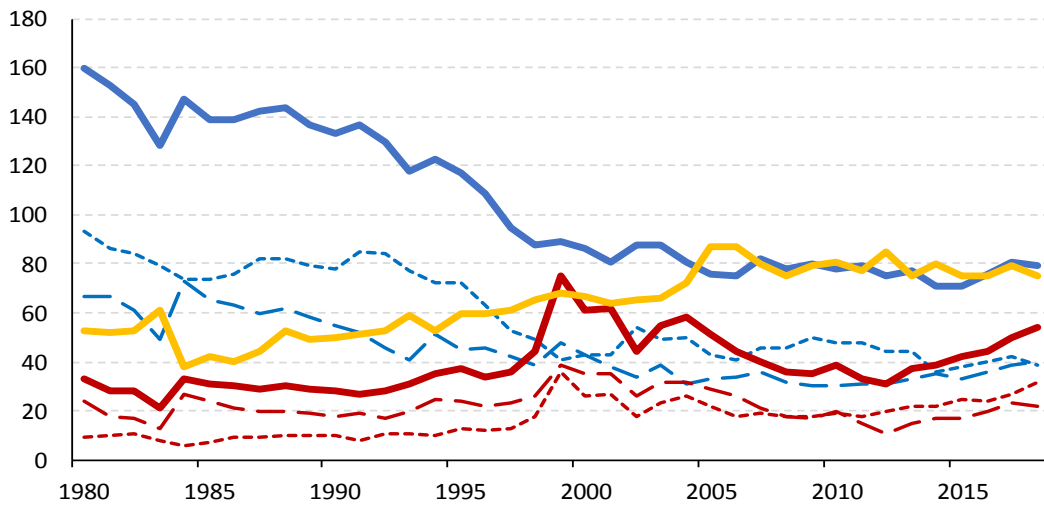
Annex Figure 5. Share of Technology Companies out of Top 500 Globally Most Valuable Companies, 1980–2018



1. Share of market capitalization of top 500 most valuable firms, by sector
(Percent)

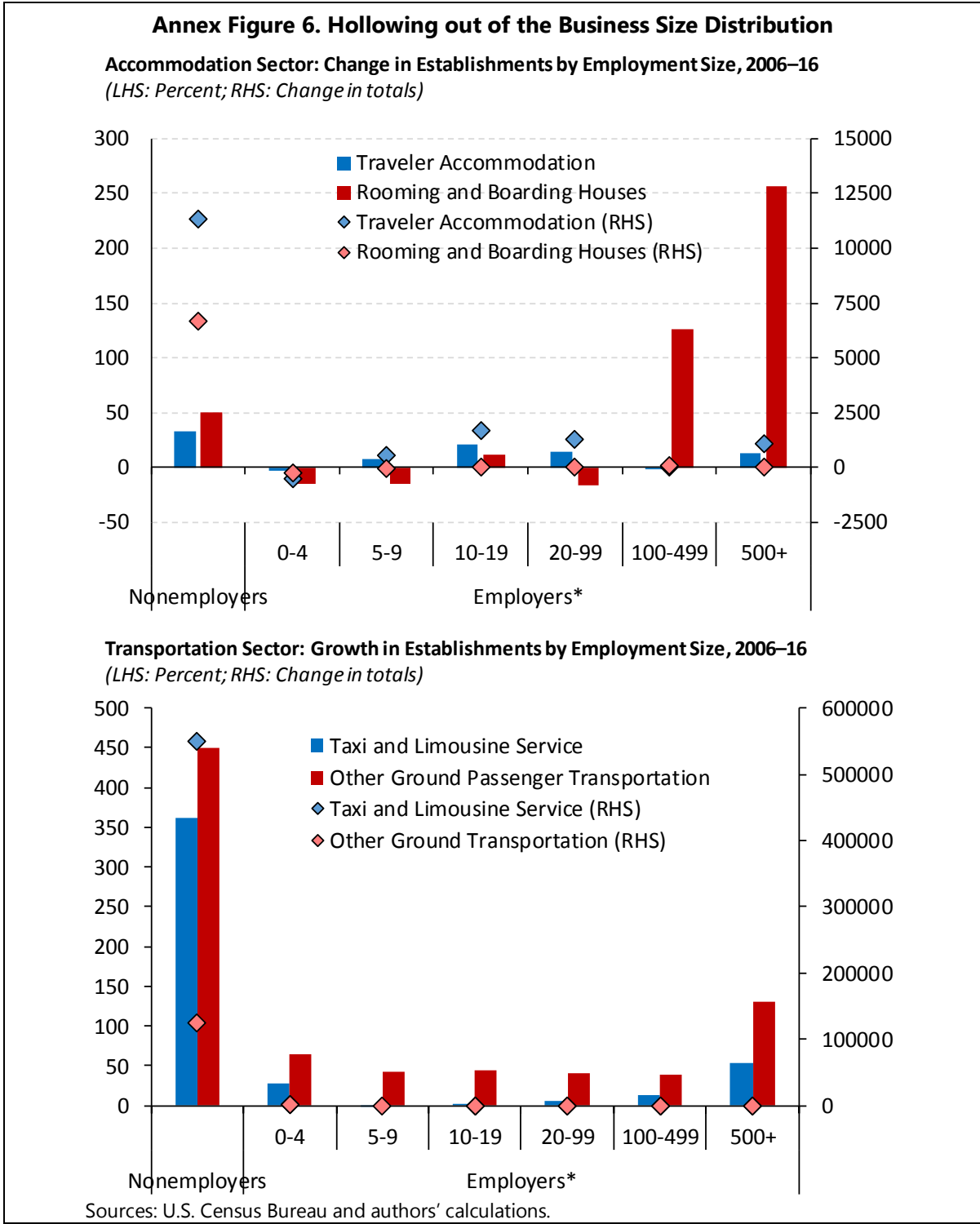


2. Number of companies in top 500 most valuable firms, by sector



Sources: Thomson Reuters Datastream and authors' calculations.

Notes: See Annex Table 1 for sectors included in technology and manufacturing aggregates.



A. Are digitalized businesses highly profitable?

The interaction between technology and the scope for market power has implications for the cost structures, profitability, and valuations of highly-digitalized businesses (see Annex II). For less digitalized businesses, the marginal costs of production typically fall as a business scales up

and then eventually increase with each additional unit because of diminishing returns to certain inputs. However, the nature of digital technologies and their inputs—which include both rival and nonrival inputs—means that digitalized businesses instead face (large) constant fixed costs (for example, substantial investment in intangible assets) and zero (or very low) marginal costs thereafter. In this way, their production is characterized by increasing returns to scale (Romer, 1990; Varian and others, 2005).

As a result, the average (variable) cost of producing digital services tends to decrease as the quantity produced increases. And the speed at which average costs fall also determines how quickly firms can approach the minimum efficient scale—that is, the lowest level of output at which all scale economies are exploited. Such large economies of scale (as well as network externalities) are what predispose many of the new technology sectors towards monopolies or tight oligopolies. In the limiting case of “natural monopolies”—where average costs continue to fall indefinitely as output expands—the minimum efficient scale is not reached until the firm has become the total size of the market (or at least very large in relation to it), meaning that the market can only ever really support one firm.

However, when considering the profitability of digitalized businesses and the tendency of technology-intensive sectors to head towards oligopolistic market structures, we can distinguish between transient and permanent monopolies. This relates to the issue of “contestability” and the free entry (and exit) of firms in a market. Contestable markets with high firm concentrations can still deliver value to consumers as long as potential competition keeps firms in check. For example, if fixed costs are not prohibitive and marginal costs are low, such that average costs fall rapidly, firms can already get close to the minimum efficient scale at a relatively small level of output, increasing the opportunities for new entrants to enter and rapidly scale up, boosting competition and applying downward pressure on prices. Furthermore, when average costs are falling rapidly and the market grows quickly, it is also possible for new firms to overcome the cost advantages of the largest incumbents via leapfrogging or developing (low-cost and, initially, low-quality) “disruptive technologies”. For these reasons, incumbent tech companies can be forced to innovate and charge low prices to make it difficult for the new entrants to dislodge them.⁵⁹

In practice, new firms may find it difficult to enter a market due to sizeable fixed costs (and other barriers to entry) and if successful, they may find it more profitable to be swallowed up by the incumbent rather than to compete with it—such “entries for buyout” create very little social value and are mainly a mechanism for the entrant to appropriate a piece of the dominant firm’s rent. At the other extreme, digitalized businesses in highly (or perfectly) competitive markets with low marginal costs would eventually be forced to shut down as optimal marginal cost pricing would lead to losses as prices are set below their average variable costs.

Furthermore, digitalized businesses have also focused on product differentiation to both secure and preserve market power, implementing various first-, second-, and third-degree price

⁵⁹ While competition to acquire monopoly will force lower prices for consumers at least for a time, such competition may also produce inefficient rent dissipation (Fudenberg and Tirole, 1985, 1987; Hillman and Riley, 1989).

discrimination strategies—such as bundling, freemium (or tiered) pricing, and minimal pricing. This allows them to charge prices higher than marginal costs and avoid making losses. To the extent that consumers are “locked in”, barriers to entry increase and digitalized businesses can then raise prices to earn supernormal profits.

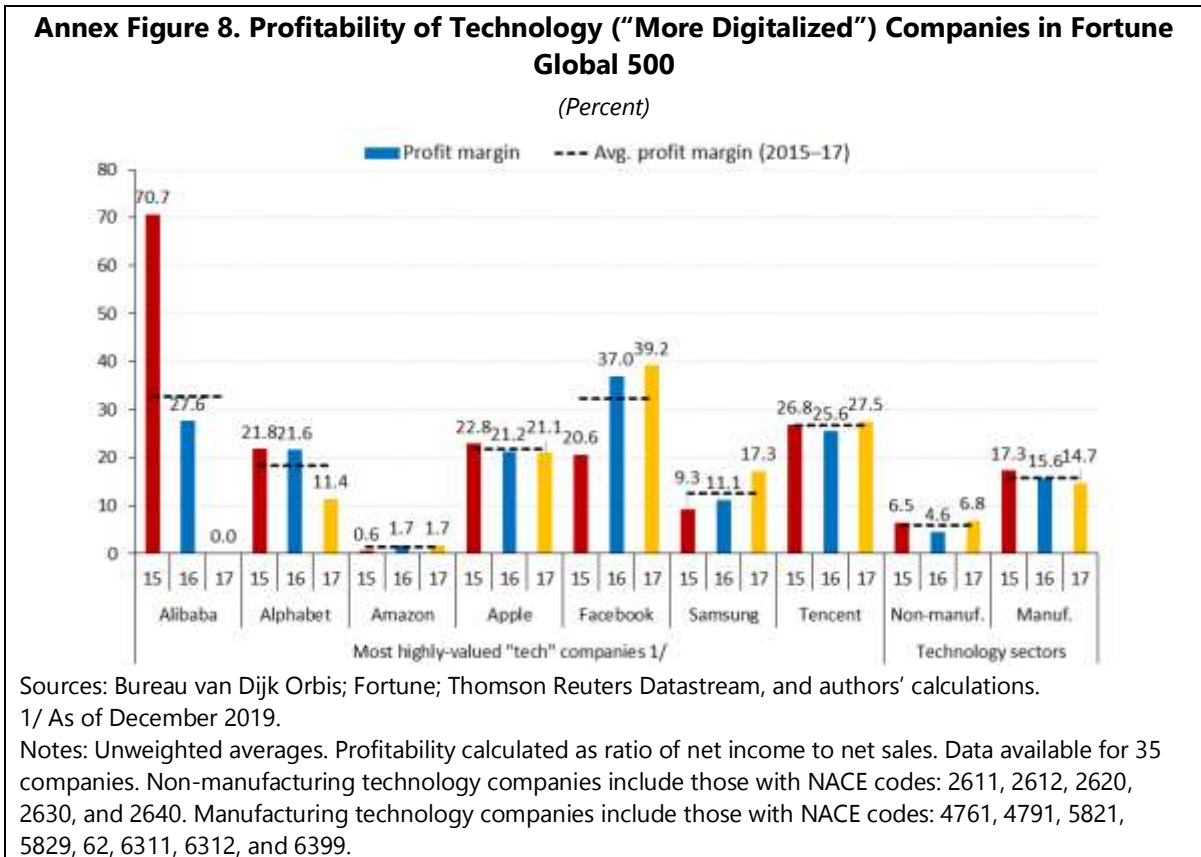
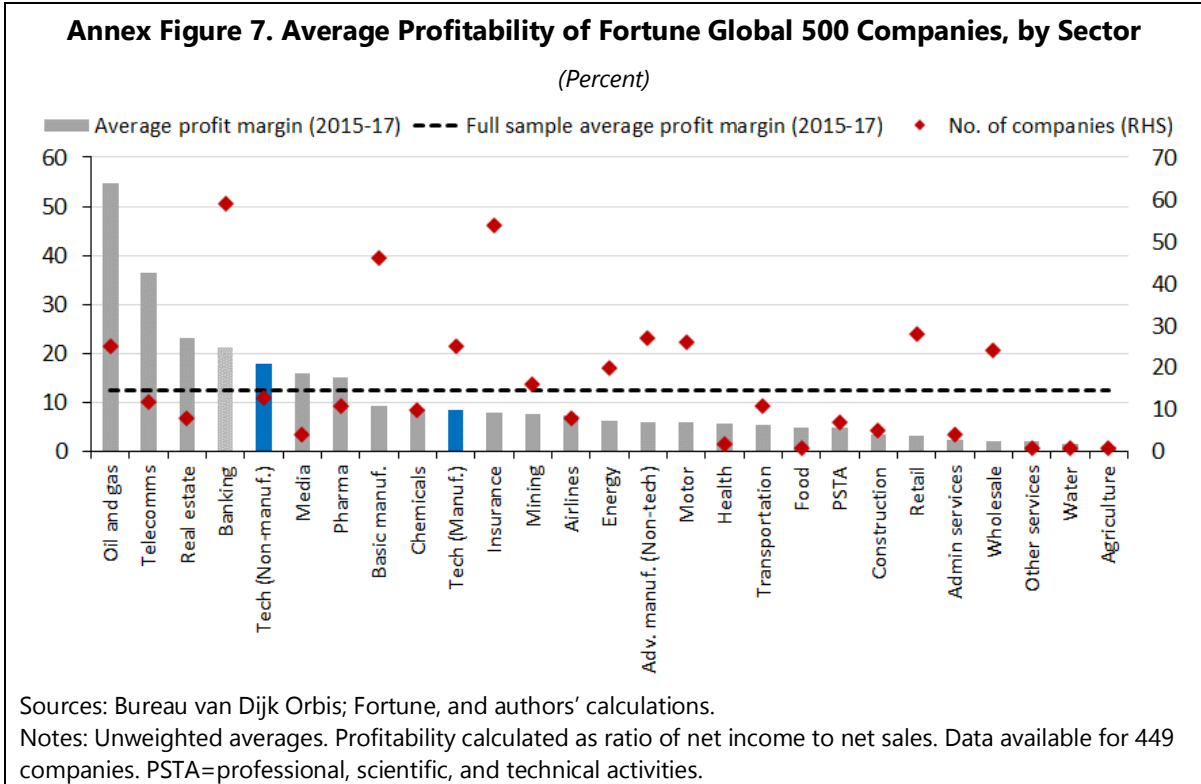
Bearing in mind the structural and strategic characteristics of tech sectors—e.g., longer-run returns to scale, incumbent pricing strategies—the potential for digitalized businesses to earn large supernormal profits make them more likely to attract investment and earn them high stock market valuations—to the extent that company valuations are determined by expectations of high(er) profit margins in the future. Therefore, we should expect to see waves of high concentration in more digitalized sectors, and companies in those markets will be highly valued. Because, even though tech market dominance may have a shelf life—which can even be due to the regulatory response by governments, which we touch on later—economic theory is indeterminate about the timing of when such companies could fall from grace.

What can we learn about actual company performance from the data that is available? Is it the case that technology sectors are on average more profitable? Are these firms also increasingly (or more consistently) highly valued over time? To answer these questions, we use globally-consolidated financial accounts data to get an idea of the aggregate performance of large multinational enterprises (data on subsidiaries and local affiliates is more limited and incomplete). We also look at the performance for a range of sectors and compare them with those that are considered the “most digitalized”.⁶⁰

Figure 6 illustrates the average profitability of the 2018 Fortune Global 500 companies based on their financial accounts data for the three years 2015 to 2017. They show that profitability varies substantially across sectors. Based on this sample and using a simple ratio of net income-to-gross income (“profit margin”), the “tech sectors” are not the most profitable. Profitability in banking, telecommunications, and pharmaceuticals are larger on average. There are also differences between different types of tech businesses: the average profitability of non-manufacturing tech firms is above the sample average, while that of manufacturing tech firms is below.

We can also compare the profitability of the seven most valuable tech companies as of December 2019 (Alibaba, Alphabet, Amazon, Apple, Facebook, Samsung, and Tencent) with the average for the two tech sectors (Annex Figure 8). What we see here is wide variation in profitability both between these seven companies and also within each company over time.

⁶⁰ The data used is obtained from a number of sources, but primarily the U.S. Bureau of Economic Analysis, Bureau van Dijk’s Orbis platform, and company-specific financial accounts.



B. Do digitalized businesses have substantially higher levels of intangible assets?

Intangible factors—such as digitization of information, R&D, and software development lie at the heart of the innovation process and determine many of the cost structures discussed earlier for digitalized business models. The importance of intangible assets—and investment in them—to business performance and economic growth reinforces the need to quantify them accurately. While they may not have a clearly discernible value as with tangible (or physical) assets such as plant and machinery or financial assets, for which markets exist, they provide value to a firm and can prove critical to its long-term success or failure. The exclusion of intangible capital from firm-level and national accounts also obscures its contributions to economic growth, productivity, and shifts in the labor share (Corrado, Hulten, and Sichel, 2009).

Both firm-level and national income accounting practices treat expenditure on intangible inputs as an intermediate expense and not as an investment. Therefore, while all expenses associated with creating an intangible asset are accounted for in the income statement, the asset created by a firm does not appear on the balance sheet and has no recorded book value. Instead, they only appear when they have been acquired. For example, since 2005 when international accounting standards changed (IFRS 3), companies are now required to post brands in balance sheets when acquired from third parties. Similarly, when a whole company is acquired, the premium of the purchase price over the book value of assets is recorded on the balance sheet as “goodwill”. Where they have been valued, some intangible assets are also not amortized.

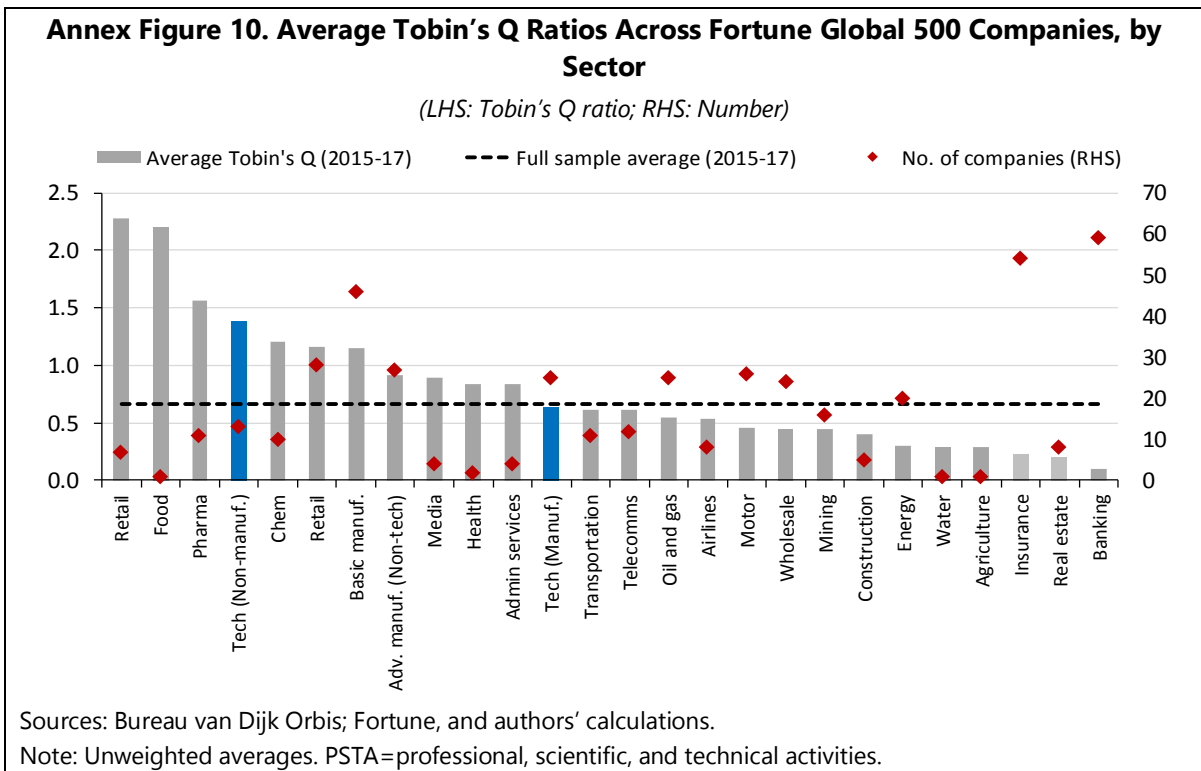
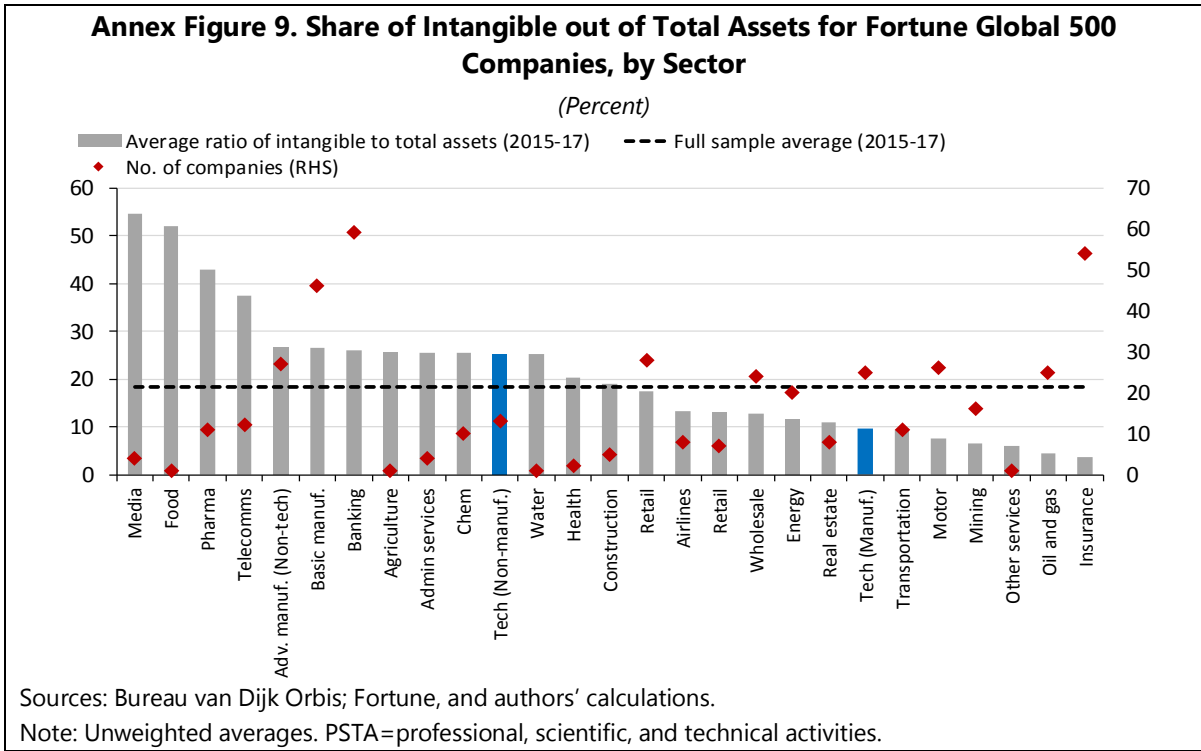
The scale of a companies’ intangible assets—such as brand recognition, good will, and intellectual property (copyrights, patents, trademarks)—matter from a tax perspective as they are an important part of the story behind profit shifting and transfer pricing problems. Intangible assets are not only easy to shift across borders but are hard to value for transfer pricing purposes given a lack of comparables. They therefore stymie the functioning of the arm’s length principle and exacerbate opportunities for tax planning (Altshuler and Grubert, 2010).

These issues, however, are not altogether unfamiliar and are certainly not unique to tech companies. They have continued to challenge international taxation over time. For example, the issue of intangibles-intensive production exists in other industries such as pharmaceuticals—which, for example, also uses large amount of proprietary scientific research, patents, etc.

What can the data tell us about the distribution of intangibles across different sectors, if anything? Digitalized firms are understood to hold substantial shares of intangible assets relative to tangible assets, given that they derive a large share of their value from intellectual property and R&D. In this way, they present potentially much greater opportunities—and present more of a risk—than other businesses (with relatively fewer intangible assets) of engaging in international tax avoidance.

Unfortunately, balance sheet data is potentially unhelpful for gauging whether tech companies hold larger shares of intangible assets, given the lax reporting requirements. Using balance sheet data, it is not immediately clear that the largest tech companies have larger shares of intangible assets. Annex Figure 8 presents the data available on the share of intangible assets out of total assets. Out of the Fortune Global 500, the reported ratio of intangible assets is noticeably highest

in communications, media, and pharmaceuticals companies, while digitalized businesses, both non-manufacturing and manufacturing, are shown to hold assets either just above or well below the sample average, respectively.



We also try to gauge the intangibility of a firm's resources by comparing the value the market places on shareholder equity with the value of total assets on a company's balance sheet (net of the book value of intangibles), i.e., the ratio of stock market capitalization to total assets, also known as a version of Tobin's Q (Annex Figure 10). Corrado and Hulten (2010) estimate that intangible capital makes up 34 percent of firms' total capital in recent years, while Hulten and Hao (2008) find that excluded intangible assets explain some 40 to 50 percent of the market value of R&D intensive companies in the U.S. and appear significant in explaining the large gaps between market and book values. What we find is that non-manufacturing digitalized businesses are valued at several multiples higher than their total assets—along with companies in the food and retail sectors. Pharmaceutical companies also show high market capitalizations relative to their balance sheets.

C. Do digitalized businesses pay zero or very low corporate income taxes?

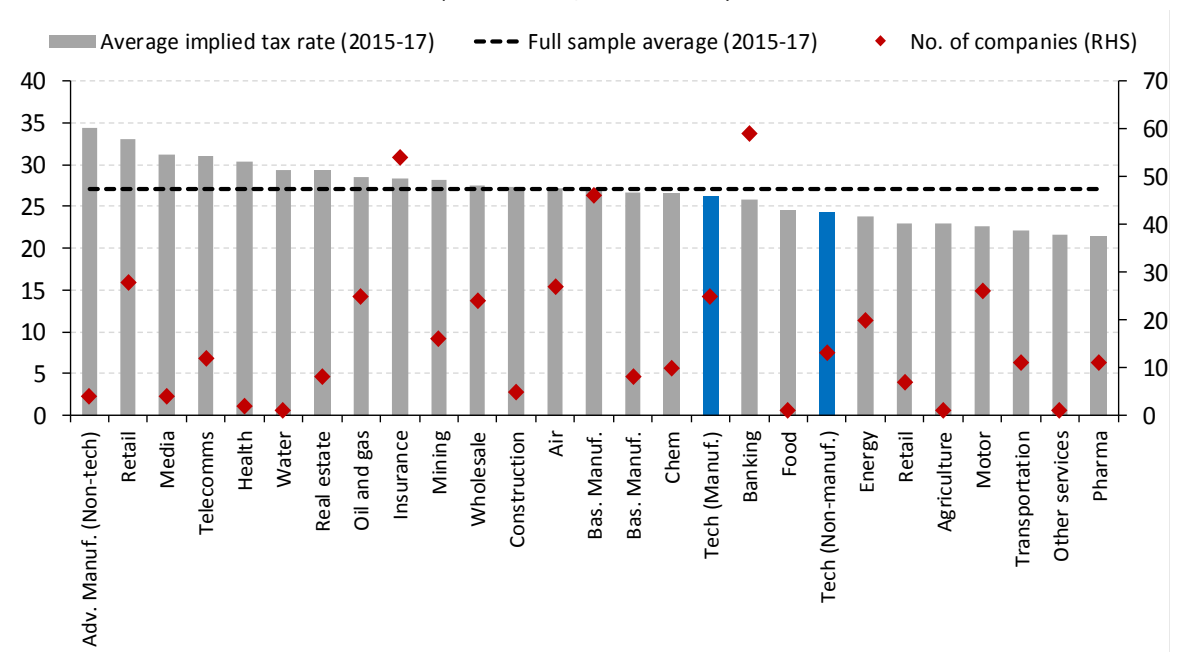
Digitalized businesses are under fire for paying minimal (or zero) income tax in the jurisdictions where they provide services—even when they have a physical presence. However, the level of taxes being paid is hard to establish using financial accounts. Multinational enterprises do not provide regional breakdowns of cash flow and income statements and balance sheets, and furthermore, taxes reported in income statements are typically provisions, and could differ from the final amounts paid to tax authorities.

Nevertheless, we can still look at reported taxes for the same set of companies, comparing them by sector. We consider two (3-year averaged) measures for the implied tax rate from data available in the cash-flow and income statements of the companies in the sample: (i) the share of taxes provisioned out of before-tax profits (Figure 11), and (ii) the share of cash taxes paid out of total cash from operating activities (Figure 12).⁶¹ What we see is that the tech sectors report implied average tax rates more or less in line with the average of other Fortune Global 500 firms. What is most striking is that the implied tax rates are certainly non-zero, and therefore we can reject the widely-held hypothesis that on average these companies pay zero or low corporate income taxes at the globally consolidated level.

⁶¹ Results are also available using cash taxes paid as a share of pre-tax income (also used in Dyreng and others, 2008) and are broadly similar. However, it is unclear whether it is appropriate to blend line items across financial statements. Different averages (5-year and 10-year) are also available upon request from the authors.

Annex Figure 11. Average Implied Tax Rates (Income Statement) for Fortune Global 500 Companies, by Sector

(LHS: Percent; RHS: Number)

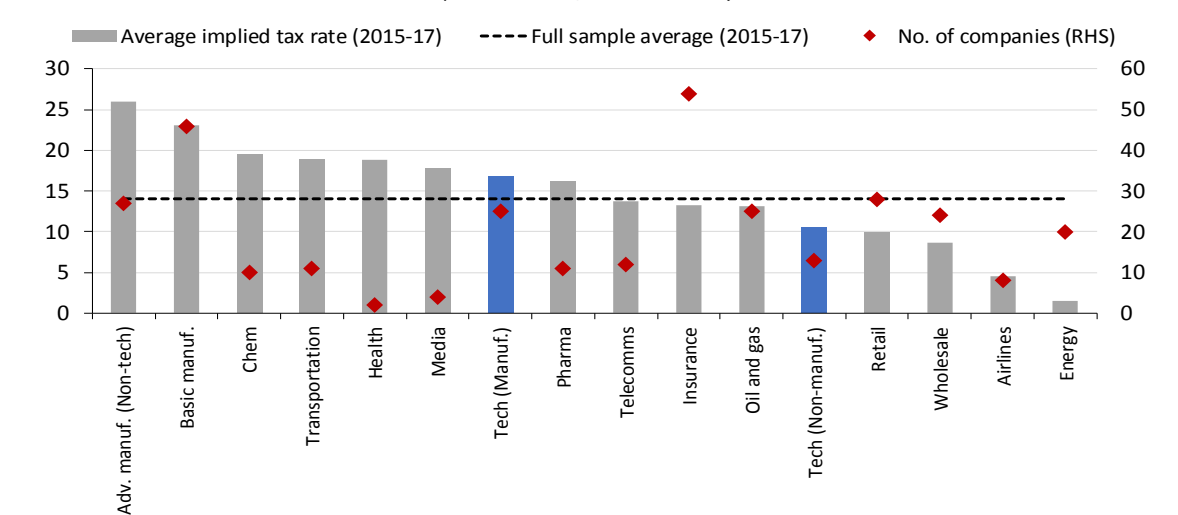


Sources: Bureau van Dijk Orbis; Fortune, and authors' calculations.

Note: Unweighted averages. PSTA=professional, scientific, and technical activities.

Annex Figure 12. Average Implied Tax Rates (Cash Flow Statement) for Fortune Global 500 Companies, by Sector

(LHS: Percent; RHS: Number)



Sources: Bureau van Dijk Orbis; Fortune, and authors' calculations.

D. Summarizing the Data

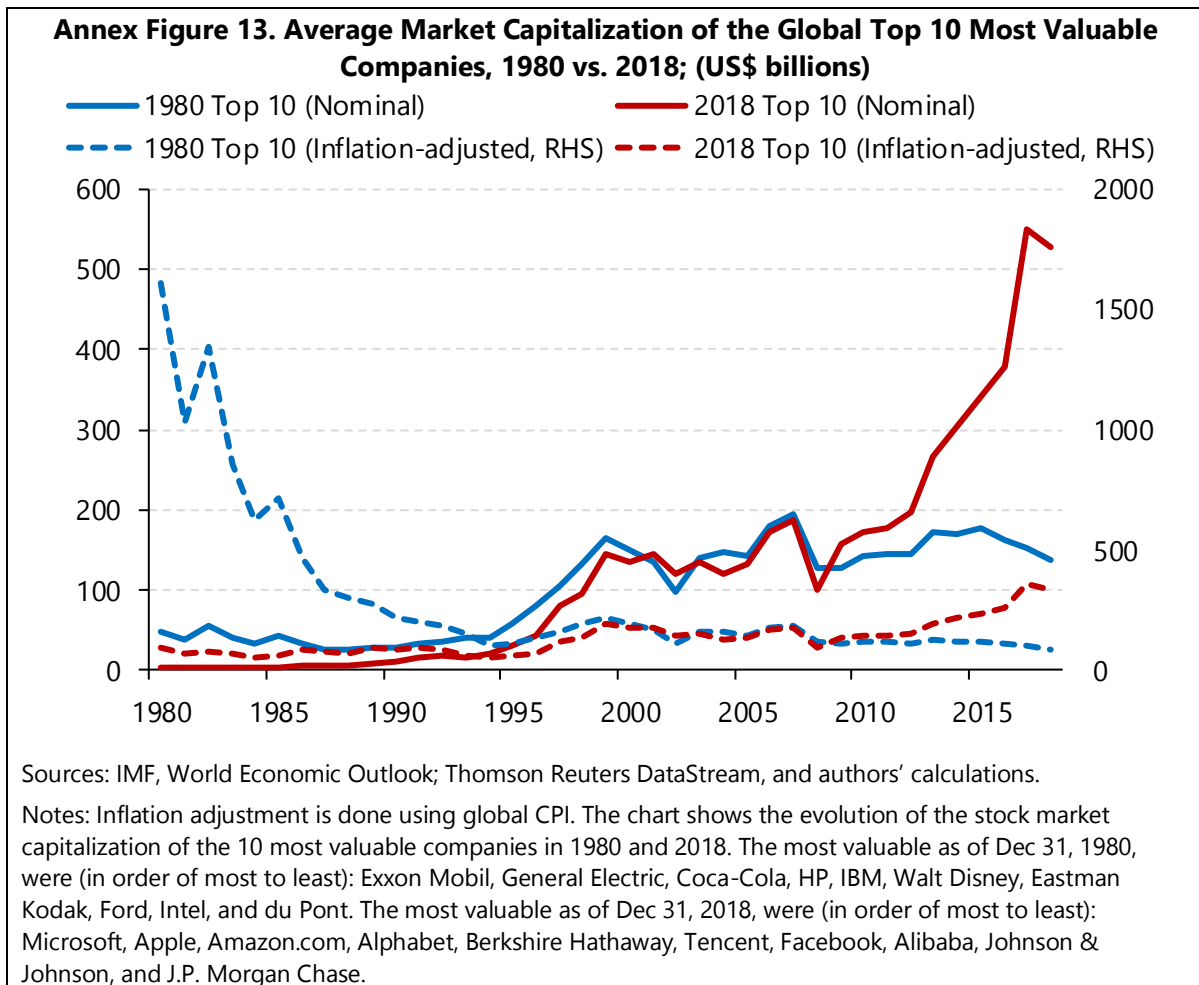
Available firm-level data sheds limited light on highly-digitalized businesses. Globally consolidated figures suggest that such businesses do not appear to be significantly more profitable on average than the rest of the sample of Global Fortune 500 firms.

Non-manufacturing digitalized businesses in the sample appear to report a much lower level of intangible assets, based on balance sheet data. However, as noted, this can be due to the fact that most of these (proprietary) assets have not been valued and, therefore, are not reported on the balance sheet. When it comes to understanding company valuations, the estimates for Tobin's Q suggest that non-manufacturing digitalized businesses have some of the largest disconnect between their market capitalizations and their balance sheets (total assets).

We also see that on average these businesses are characterized by average implied tax rates that in line with the average for the sample—using both data from the income and cash flow statements. However, availability of data remains an important constraint for ascertaining the true properties of these companies. As a result, we treat the findings above with a degree of caution. Ideally, globally consolidated together with unconsolidated cross-country administrative data would provide a clearer picture of operations at the level of the parent and subsidiaries—and the greatest opportunity to evaluate the distribution of assets, profits, revenues, and costs.

Annex II. The Impact of Returns to Scale on Costs for Highly-Digitalized Businesses

The debate over taxation and digitalization has coalesced around a handful of large tech-heavy digitalized multinational enterprises with business models that are viewed as epitomizing the type of digitalization that has fundamentally upset the international tax architecture.⁶² They have garnered special attention for the speed with which they have come to dominate stock markets, breaking records to become the most highly-valued businesses in the world within the space of a decade—Apple and Amazon broke the USD 1 trillion market capitalization mark in August and September 2018, respectively. As of end-2019, 7 of the 10 most valuable companies are so-called “tech” companies, involved in the production of digital (hardware and software) and services. Annex Figure 13 shows more generally how the average nominal stock market valuations of the 10 most valuable companies dwarfs those of the 10 most valuable companies from almost 4 decades ago, although in real terms, the difference is less dramatic.



⁶² Of course, highly-digitalized MNEs are not the only large businesses accused of abusing the international corporate income tax system to lower their tax liabilities. However, their business models present some of the fiercest challenges.

These strong valuations are driven by the interaction of a number of structural and strategic factors that have allowed these firms to achieve economies of scale rapidly, creating a tendency for natural monopoly and strong expectations of high future profitability. Structural (technological) factors include low marginal costs, network effects, and an ability to sell remotely, while strategic factors include first-mover advantages and pricing behavior by incumbents. This Annex provides some of the basic theoretical background for the cost structures and strategic behavior of these large highly-digitalized businesses, drawing from the theory of the firm and the broader field of industrial organization.

We take as a starting point the general result that firms typically maximize profits (and minimize losses) by producing at the point where the marginal revenue earned from selling an additional unit of output equals its marginal cost of production. In a perfectly competitive environment, firms have no market power to determine prices and can sell at the prevailing market price, which means that they face perfectly elastic (horizontal) market demand at that price. In this setting it is optimal for firms to produce at the point where price (which equals the marginal revenue) equals marginal cost. However, the presence of large fixed (sometimes unrecoverable or “sunk”) costs and zero/low marginal costs for digitalized businesses has implications for the relevant cost structures and barriers to entry that drive the competitive landscape of their markets.

A. Increasing Returns to Scale

For the typical firm, the law of diminishing returns states that as we add more units of a variable input (e.g., labor) to fixed amounts of other inputs (e.g., capital or land), the change in total output will at first rise and then fall in the short run. For example, diminishing returns to labor occur as the marginal product of labor starts to fall, which means that total output will be increasing at a decreasing rate. The marginal cost of supplying an extra unit of output is linked with the marginal productivity of labor. Therefore, the law of diminishing returns implies that the marginal cost will rise as output increases. Furthermore, rising marginal costs will lead to a rising average total costs.

Romer’s (1990) seminal contribution to economic theory was highlighting the importance of non-rival but partially excludable inputs to production—such as “ideas”, knowledge, or the sorts of algorithms that are integral to digitalized businesses—for production and aggregate economic growth. Such non-rivalry means that (aggregate) production is characterized by increasing returns to scale leading to sources of endogenous growth. Romer also went on to emphasize that both imperfect competition and externalities are important for the generation of new ideas—imperfect competition, in particular, provides the profits that incentivize entrepreneurs to innovate.

In the presence of nonrival inputs (A) and constant returns to scale for rival inputs, e.g., physical capital (K) and labor (L), a firm’s production function $f(\cdot)$ exhibits increasing returns to scale, i.e. if we scale all inputs by some factor, $\lambda > 1$, we will increase output by more than λ :

$$f(A, \lambda K, \lambda L) = \lambda f(A, K, L) < f(\lambda A, \lambda K, \lambda L).$$

If the technology is Cobb-Douglas: $f(A, K, L) = A^{\alpha_A} K^{\alpha_K} L^{\alpha_L}$, where $\alpha_i > 0, \forall i \in \{A, K, L\}$, increasing returns to scale occur given that:

$$\alpha_A + \underbrace{(\alpha_K + \alpha_L)}_{\text{equals 1}} > 1.$$

For firms with technologies that exhibit increasing returns to scale, factors cannot be paid their marginal product from the output produced—following Euler’s Theorem:

$$f(A, K, L) < f_A A + f_K K + f_L L.$$

Therefore, in a perfectly competitive environment, firms would suffer a loss. If the non-rival input is to receive any compensation, at least one other factor must be paid less than its marginal product. The growth literature developed two basic ways to handle this problem: externalities and imperfect competition, both of which imply that at least one factor will be paid less than its (social) marginal product, and therefore the resulting equilibrium will not generally be efficient (Jones, 2005).

B. Cost Functions

Each firm has a cost function, $c(\mathbf{p}, y)$, which represents the solution to the firm’s cost minimization problem of producing a given amount of output, y , for a given vector of I factor inputs, \mathbf{z} , and their corresponding prices, \mathbf{p} . The firm cost minimization problem can be written as

$$\min_{\mathbf{z} \geq 0} \mathbf{p} \cdot \mathbf{z},$$

subject to

$$f(\mathbf{z}) \geq y.$$

The following first order conditions must hold for all inputs $i = 1, \dots, I - 1$:

$$p_i \geq \lambda \frac{\partial f(\mathbf{z}^*)}{\partial z_i} \text{ with equality if } z_i^* > 0 \text{ (1).}$$

The Lagrange multiplier, λ , can be interpreted as the marginal value of relaxing the constraint $f(\mathbf{z}^*) \geq y$, and equals the marginal cost of production, $\partial c(\mathbf{p}, z)/\partial y$.⁶³

We can get an idea of how marginal costs behave in the presence of non-rival inputs and increasing returns to scale. Consider the case where production uses two broad classes of inputs, one rival (z_1) and the other non-rival (z_2) with associated prices, $\mathbf{p} = (p_1, p_2)$, and the technology is Cobb-Douglas as above $f(z_1, z_2) = z_1^{\alpha_1} z_2^{\alpha_2}$. In this case the cost function in this case is given by

$$c(\mathbf{p}, y) = \theta p_1^{\frac{\alpha_1}{\alpha_1 + \alpha_2}} p_2^{\frac{\alpha_2}{\alpha_1 + \alpha_2}} y^{\frac{1}{\alpha_1 + \alpha_2}}$$

where θ is a constant equal to: $\theta = \left(\frac{\alpha_1}{\alpha_2}\right)^{\frac{\alpha_2}{\alpha_1 + \alpha_2}} + \left(\frac{\alpha_2}{\alpha_1}\right)^{\frac{-\alpha_1}{\alpha_1 + \alpha_2}}$.

We can derive an expression for marginal cost by looking at the second derivative of the cost function:

$$\frac{\partial^2 c(\mathbf{p}, y)}{\partial y^2} = \left(\frac{1}{\alpha_1 + \alpha_2 K}\right) \left(\frac{1}{\alpha_1 + \alpha_2} - 1\right) \theta p_1^{\frac{\alpha_1}{\alpha_1 + \alpha_2}} p_2^{\frac{\alpha_2}{\alpha_1 + \alpha_2}} y^{\frac{1}{\alpha_1 + \alpha_2} - 2}$$

⁶³ If $f(\cdot)$ is concave, then condition (1) is necessary and sufficient for \mathbf{z}^* to be an optimum.

The sign of this function, and therefore whether marginal costs are constant, increasing, or decreasing will depend on whether or not $\frac{1}{\alpha_1 + \alpha_2}$ is equal to 1, greater than 1, or less than 1, respectively.

As mentioned, for Cobb-Douglas production function, we have increasing returns to scale when $\alpha_1 + \alpha_2 > 1$. This means that $\frac{1}{\alpha_1 + \alpha_2} < 1$ and, therefore, marginal costs fall as output increases, i.e., the second derivative of the firm's cost function will be negative. Therefore, to the extent that (non-rival) technology lead to increasing returns to scale for production for some businesses, they can face and falling marginal costs such that the average (variable) cost of production, $\frac{c(p,y)}{y}$, tends to decrease as the quantity produced, y , increases.

C. The Case of Digitalized Businesses

Digitalized businesses are a perfect example of businesses that use non-rival inputs in production—for example, intellectual property, user data, and other intangibles—and are therefore subject to increasing returns to scale. They are akin to the imperfectly competitive entrepreneurial researchers in Romer's model that are developing new technologies to capture the financial rewards that can be earned by innovating.

However, while digitalized businesses are likely to experience increasing returns to scale over a large amount of output, it is also possible in the short term (after a very high level of services production) that eventually even these types of businesses will experience constant, and possibly, decreasing returns to scale. While large scale effects would suggest overall data production is also likely to exhibit falling marginal and average costs, eventually even data collection could exhibit constant or decreasing returns to scale in the short term and therefore constant or rising average costs (Varian, 2019). In other words, holding other inputs constant in the short-run, the marginal product of data could decline after a certain level of data collection and the contribution of data to the value of the digital service being produced will fall.

Even if new user data has the same cost to collect as the last batch acquired, it can potentially yield increasingly less value. This could be because previously-collected data already provides a good profile of a user for the purposes of advertising. Therefore, the new data you acquire might already overlap to a large extent with a company's existing corpus of data on the user and doesn't add any new insights about the user's preferences—therefore, this new information about the user is less valuable to the digital service being produced.

This precise relationship will differ depending on the context and the use of the data. For example, in the context of advertising, the marginal contribution of the data may decline more quickly than in the case of medical research, where having a large number of observations is particularly important.

Annex III. Destination- vs. Source-based Taxing Rights

A. Claiming source-based rights

The initial wave of digitalization some 30 years ago—in the form of e-commerce transactions—already began to strain the source principle of linking items of income with specific geographical locations. And the more recent wave continues to apply increasing pressure by allowing businesses of all sizes—not just large multinational enterprises—to operate remotely across multiple jurisdictions, while cruising safely below permanent establishment thresholds. Therefore, two motivations for establishing source-based taxing rights over physically remote digitalized businesses have been offered to rectify this issue:

- Many governments claim that sustained user engagement and participation are integral to digitalized businesses, with users (co-)creating value even if the businesses with which they interact are not physically present at their location. If countries were to agree that users provide their data as valuable inputs to production, then users should be deemed a source. As a result, the governments of jurisdictions in which users reside should have the right to tax those profits attributable to those users.
- For digitalized businesses to be able to operate remotely, they have been able to take advantage of country-specific investments in ICT and other public goods—for example, physical (digital) infrastructure, distribution networks, and the legal system. As a result, they have developed a virtual economic allegiance within jurisdictions by becoming heavily intertwined in the economic livelihood of their local customers (businesses and citizens) even without any physical presence.⁶⁴ Many argue that both (either) the “benefit principle” and (or) the substantial virtual economic presence justify the source-based right for a country to levy “compensatory” taxes on any locally-earned income—though this justification is no stronger than for traditional exports.

B. Claiming destination-based rights

While destination is the traditional basis for consumption taxes, it could also be used for income taxation. This can be done using “border tax adjustments”, under which businesses are no longer able to deduct the cost of imported goods and revenue from exports would also no longer be taxed.⁶⁵ Taxing goods where they are sold instead of where they are produced would require a fundamental overhaul of the global approach to income taxation.

More generally, the rationale for user-based taxing rights is that the joint determination of profits—through the interaction of demand and supply—automatically justifies taxing rights and profit apportionment to market countries, conditional on their attributes, e.g., size and

⁶⁴ However, the existence of a market with a well-developed public infrastructure, which can be exploited to access to customers, is not unique to the digitally-provided services.

⁶⁵ See, for example, Auerbach and others (2017), Avi-Yonah (2015), and Devereux and de la Feria (2014).

sophistication of consumers.⁶⁶ For highly-digitalized businesses, Cui (2018) asserts that it is consumers who generate network externalities, which allow for monopoly pricing. The associated location-specific rents can then be used to justify destination-based rights. The benefit principle could also be used to justify taxing rights for a destination country: without the infrastructure to support remote digital sales, the market would not even exist.

On a practical note, for many online services, the final consumption of products is directly observable, unlike 'user value'. As discussed in Section II, this is true in the case of direct sales recorded by online retailers; user activity logged on digital platforms (including social media and search engines), and the value of advertisements viewed. Moreover, since consumers are immobile, destination-based tax instruments may have desirable efficiency properties, as well as limiting the opportunities for profit shifting and tax competition if designed correctly.

⁶⁶ This idea was debated and recognized among the League of Nations when the structure of the international taxation was established in 1923. As cross-border trade and investment gathered momentum, the concept of "economic allegiance" between a particular jurisdiction and the income of the person to be taxed and how it could be subdivided was developed in 1923 by the League of Nations to prevent double taxation (Bruins and others, 1923). In considering the 'production of wealth', it was acknowledged that "the oranges upon the trees in California are not acquired wealth until they are picked, and not even at that stage until they are packed, and not even at that stage until they are transported to the place where demand exists and until they are put where the consumer can use them. These stages, up to the point where wealth reaches fruition, may be shared in by different territorial authorities." That is, that both production and consumption are important contributors to the generation of profits. However, at the time it was agreed by the League of Nations that the origin—or the "source"—and the residence of the recipient of the income were given primacy.

Annex IV. Alternative Fiscal Instruments for Taxing User Value

Beyond the use of royalty instruments, fiscal regimes in the natural resource sectors provide some additional ideas for how governments might seek compensation for the use of their citizen's data.

A. Additional Profits Taxes (Surtaxes)

Most countries apply the standard corporate income tax regime to their extractive sectors. However, in an attempt to capture greater economic rent, countries often apply a higher corporate income tax rate on their resource sectors or introduce an additional tax on the profits from resource projects. Indeed in the 1970s, recognizing the potential for large economic rents in the resource sectors, a number of countries introduced resource rent taxes which were linked to the rate of return or the investment payback ratio.⁶⁷ For those highly-digitalized businesses generating large profits, as explored in Annex I, and with government's claiming that a large share of these profits are generated through the exploitation of user data, should the profits from data collection be taxed more heavily than other industries?

B. Production Sharing Systems

In the petroleum sector, countries often adopt contractual schemes which involve the sharing of production, through production sharing contracts. Under such a system, the legal ownership of the resource is maintained in the hands of the government, and the private contractor recovers costs by retaining some of the physical product as 'cost petroleum', while the remaining 'profit petroleum' is shared with the government.⁶⁸

We can apply this 'sharing' concept to the personal data economy, based on the notion that data is also a commodity which has intrinsic value to the government for its own use. To give just a few examples, consumer retail data may be useful to governments in analyzing consumer behavior when making policy decisions or in measuring the economy, driver data may be used in analyzing traffic patterns and transport policy, and individualized data could even be used for audit and verification purposes in tax administration.

One could therefore conceive of data sharing agreements, whereby governments are also given access to the data collected by a digitalized business as part of the fiscal regime constituting the 'resource charge'. Of course, such data would need to be provided in a form that is usable by governments, and much would need to be agreed upon in a legal framework. And the willingness of companies to grant such access to information will be a function of both institutional and sociopolitical factors. Companies may be reluctant to provide such information,

⁶⁷ Other more ad-hoc methods to capture additional upside included sliding scale taxes (most commonly royalties) linked to commodity prices, production volumes, turnover, or profit to sales ratio (Baunsgaard, 2001).

⁶⁸ While historically, the creation and adoption of this type of contract was to allow governments to take a portion of production in kind for domestic use, many countries in reality elect to have the production marketed by the operator on their behalf, and instead take the value of the production in cash.

to protect the privacy of users, and to avoid deterring user participation, particularly where trust in government is low or rule of law is weak.

C. State Participation

Governments often opt to hold equity in resource projects to secure additional government take from profitable projects. State participation is also sometimes motivated by non-fiscal issues, such as a desire for direct government ownership and control over the development of the project, or to facilitate the transfer of knowledge, although it is widely acknowledged that these benefits could also be achieved by regulation (IMF, 2012). A number of countries, such as Mexico and Saudi Arabia have maintained fully nationalized resource industries, while others have allowed private sector participation, but required a certain level of state participation in resource projects. Looking to the data economy, could we envisage state participation in highly-digitalized companies on similar bases? Indeed, with the private sector racing ahead of the public sector in the area of digital innovation, such participation in digitalized businesses might allow for knowledge transfer to the government regarding data collection and processing.

State equity can take different forms. A working equity interest gives the government a stake in the venture on the same terms as private investors, while under a carried interest arrangement, private investors finances the government's stake and recover these costs from the government's share of future profits. A third variant, albeit less common, is for governments to require an unpaid or 'free' equity stake, which allows it to receive a share of profits without contributing to the costs—fiscally equivalent to a dividend withholding tax (IMF, 2012).

The 'data dividend' proposed by Californian Governor Gavin Newsom in 2019—payable by data collectors to consumers, either directly or through a state-owned fund, to compensate the owner of the resource—embodies the 'free equity' concept.⁶⁹ Depending on how ownership rights are defined (as noted above), such dividends could be payable to individuals or to governments as the custodian of data rights.

⁶⁹ See 2019 California State of the State Address: <https://www.gov.ca.gov/2019/02/12/state-of-the-state-address/>.