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Address new challenges to taxation in the digital economy: Separate Accounting or Formulary Apportionment?

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ABBREVIATIONS AND ACRONYMS

APA	Advance Pricing Arrangement
API	Application Program Interface
ATAD	Anti-Tax Avoidance Directive
B2B	Business-to-Business
B2C	Business-to-Consumer
BEPS	Base Erosion and Profit Shifting
CFC	Controlled Foreign Company
DEMPE	Development, Enhancement, Maintenance, Protection & Exploitation
EC	European Commission
EU	European Union
G20	Group of Twenty
GAAR	General Anti Avoidance Rule
ICT	Information and Communication Technology
IMF	International Monetary Fund
IP	Intellectual Property
IT	Information Technology
MNE	Multinational Enterprise
MTC	Model Tax Convention
OECD	Organisation for Economic Cooperation and Development
PE	Permanent Establishment
R&D	Research and Development
TFDE	Task Force on the Digital Economy
U.S	The United States
UNCTAD	United Nations Conference on Trade and Development
VAT	Value Added Tax
WTO	World Trade Organization

INTRODUCTION

The fundamental principle for taxation on cross-jurisdictional activities is that taxation should take place where value is created. The digitalisation of the economy has posed challenges to determine the location of value creation, though. It is because of three salient features of the digital economy: heavy reliance on intangible assets, a high degree of centralisation of activities and the increasing importance of data user and participation with the two-sided nature (OECD, 2018a).

Currently, the taxing rights are entitled to a country if a multinational enterprise (MNE) has a significant physical presence in this country. In the digital economy, this paradigm is likely to be outdated as the adoption of remote sales and the centralisation of activities allow MNEs to reach global customers without significant physical presence in market jurisdictions.

With regard to profit allocation, separate accounting and the arm's length principle are the international consensus. Separate accounting treats each member of an MNE as an independent enterprise. Transactions between associated enterprises must be priced as if they were independent enterprises, i.e., at the arm's length. The arm's length principle requires for comparable transactions. In the conventional economy, transactions mostly relate to physical commodities so it is easy to find comparables. However, it may not be the case for the digital economy where transactions typically involve unique and hard-to-value intangibles or highly integrated operations. In an attempt to tackle this problem, the Organisation for Economic Cooperation and Development (OECD) has adjusted the transfer guidance on intangibles with details on how to apply the transactional profit split method. Unlike the other transfer pricing methods, the transactional profit split method evaluates the contributions of all involved parties to split profits. Nevertheless, it seems difficult to apply this method.

In the meantime, digital MNEs have taken advantage of weaknesses of the current international taxation system to execute aggressive tax planning. Although digitalisation itself does not create new Base Erosion and Profit Shifting (BEPS) practices, its salient characteristics exacerbate BEPS risks (OECD, 2015a). The current profit allocation rules distribute profits from intangibles across the involved entities on the basis of the legal ownership of the intangibles, as well as on the basis of risk assumed and assets used. Digital platforms can easily manipulate the existing rules by transferring intangibles and centralising

core activities in a low-tax country. Accordingly, most revenues are subject to tax in this country at a low rate. Clearly, the current taxation framework disregards the increasing importance of user contribution to value creation in the digital economy when determining the taxing rights and allocating profits among countries. In fact, high-tax countries have earned small tax revenues from digital businesses in spite of their high number of users.

Many European countries have suffered from this phenomenon. The European Union (EU) highlights that such aggressive tax planning of giant technology companies leads to a major fiscal distortion, threatening a level playing field: highly digitalised businesses face a much lower effective tax rate in comparison with brick-and-mortar businesses. Simultaneously, digitalised businesses are expected to enjoy an ever-increasing market presence. Accordingly, high-tax jurisdictions are likely to experience a severe reduction in their tax revenues. Hence, the EU has recently called for immediate and ambitious actions to tackle digital taxation.

In addition to the EU, the taxation of the digital economy has been put high on the political agenda in many other countries, including the OECD and G20. Until now, there has been no consensus on a multilateral approach to address the fundamental problems while many countries have taken uncoordinated and unilateral measures including alternative applications of the PE threshold, withholding taxes and turnover taxes (OECD, 2018a).

Although introducing new recommendations in the course of BEPS Action Plan to tackle new challenges to taxation in the digital economy, the OECD generally remains in favour of separate accounting and the arm's length principle. In contrast, the EU has made bold moves to endorse a Digital Tax Package with two separate solutions: first, an interim turnover tax on certain income categories of digital businesses, and second, a long-term solution with a new digital PE concept and an ultimate integration into the Common Consolidated Corporate Tax Base (CCCTB) project. The CCCTB project gives a single set of rules for calculating the corporate tax base instead of 27 different national tax systems under the current system. The profits of all associated entities will be consolidated and then apportioned between concerned Member States according to a predetermined formula. This implies that unlike the OECD, the EU supports the adoption of a formulary apportionment method to split profits across the Member States. Remarkably, for the first time, the EU proposes to include the data factor in the apportionment formula in order to reflect the

contribution of data and user participation to value creation in the digitalised economy. In other words, the apportionment formula proposed by the EU includes four factors: sales, property, labour and data. The inclusion of the data factor may allow high-tax countries to secure their tax base.

In this context, the aim of my thesis is to learn more about new challenges to international taxation arising from the specific features of digitalisation, including the two-sided nature. Also, it examines various tax developments around the world to enhance fair international taxation and to deter MNEs from harmful tax practices. The thesis will give a close look at the recent solutions provided by both the OECD and the EU, evaluating the efficiency of separate accounting and formulary apportionment to deal with digital taxation. Another objective is to explore the impact of the data factor on the fairness of taxation, tax incidence and tax competition across the Member States.

To this end, the thesis is divided into two main parts. The first part discusses the digitalisation of the economy and the emergence of two-sided platforms. The understanding of two-sided platforms, particularly cross-group network effects, is the key to examining how digital businesses may respond to different tax measures. This part also includes an analysis of tax challenges arising from digitalisation and a summary of tax measures taken by many countries to address such new challenges. The second part focuses on evaluating how formulary apportionment with a data-including formula better reflects the contribution of data and user participation, simplifies and enhances the efficiency of profit allocation across the Member States.

An interdisciplinary approach is required to learn about digital taxation. Obviously, a deep understanding of international taxation is a prerequisite. In order to evaluate the efficiency of the current international taxation system to tax digital businesses, it is critically important to understand the digital economy: its evolution and its salient characteristics that set it apart from the conventional economy. Knowledge of economics and industrial organization is needed to analyse value creation in the digital economy, as well as to examine the behaviours of digital businesses and their potential responses to a change in tax policy. Knowledge from other courses at university also helps me to study digital taxation more efficiently. I used knowledge of finance to analyse a company’s financial performance. The marketing course gives me the understanding of the business model related to online

advertising through which I illustrate my points of view. By bringing knowledge of various areas together, I could see international taxation from a different angle.

I started my research by exploring the literatures on the relevant areas, namely, two-sided platforms, separate accounting and formulary apportionment. After reading numerous reports of the OECD and the European Commission (EC), academic articles and text books, I had an overview of what is known and what needs to be further investigated on the topic. Inspired by the recent Digital Tax Package of the EU, I decided to expand previous studies on whether formulary apportionment could be an alternative to separate accounting to allocate multinational income to the associated entities. The difference in my research is to account for new salient features of digitalisation, particularly two-sidedness and increasing dependence on user contribution to answer this question.

For the sake of illustration, I take Google as an example to demonstrate how a two-sided digital platform operates and structures its tax arrangement with real data provided by Amadeus. Also, the model of Kolmar and Wagener (2007) is developed to explore how a two-sided digital platform may respond to a tax increase under formulary apportionment.

PART 1: TAX CHALLENGES ARISING FROM DIGITALISATION

1. The digitalisation of the economy

1.1. Increasing importance of the digitalising economy

The fast emergence of the digital economy has been the most noteworthy trend in the past decade thanks to a boost in performance of and a constant price reduction in Information and Communication Technology (ICT). The digital economy can be defined as *"the application of internet-based digital technologies to the production and trade of goods and services."* (UNCTAD, 2017, p. 170). Digital MNEs have enjoyed an exceptional annual revenue growth of 14% in comparison with a low range between 0.2% and 3% for other multinationals according to the EC (2018). At the end of 2015, 10 tech MNEs made up about 26 per cent of the total market capitalization of the top 100 MNEs in the United Nations conference on Trade and Development (UNCTAD) ranking, a share over twice larger than their share in number, assets and operating revenues. Remarkably, digital MNEs made about 70 per cent of their sales abroad with only 40 per cent of their assets based outside their home countries (UNCTAD, 2017). This trend can be explained by increasingly heavy reliance on intangibles, distant operation and automations in the digital economy. This also implies that tech giants can reach customers in the market jurisdiction without significant physical presence therein.

1.2. Salient characteristics of the digitalising economy

The digitalisation of the economy has certain characteristics to set it apart from the conventional economy (OECD, 2018a). First, intangibles are ever more important. Second, digital business models are integrated with a high level of centralisation of activities. Third, data and user participation play central roles in value creation, particularly in case of a multi-sided business with both intra- and intergroup externalities.

The following section describes each of these peculiarities in more detail:

a. The digital economy heavily relies on intangibles such as software, application and online platforms. Intangibles are typically difficult to price due to its uniqueness. Intangibles can be easily moved around countries and can be located distantly from both the location of development and the location of end customers. MNEs have an incentive to assign and transfer the rights to various intangible assets to a subsidiary in a jurisdiction with a low

tax rate. In most cases, the transfer takes place at a low price on account of the lack of sufficient performance track record of intangibles at the time of the transaction. Additionally, income from the exploitation of intangibles (e.g., remote sales) is highly mobile and then easily shifted into an associated entity in a tax-favoured country irrespective of where it was earned.

b. Businesses are increasingly able to manage their global operations on an integrated basis. The OECD (2017c, p.7) defines a highly integrated operation as:

   "A high degree of integration means that the way in which one party to the transaction performs functions, uses assets and assumes risks is interlinked with, and cannot reliably be evaluated in isolation from, the way in which another party to the transaction performs functions, uses assets and assumes risks."

   The integration in the business operations leads to difficulty in determining the level of risks assumed and assets used by each entity. Hence, the question arises as to how to ensure a fair allocation of income from intangibles across the associated entities. In addition, business models heavily based on intangibles allow digital businesses to centralise activities in a particular location in the best of their interest. In other words, digital MNEs can choose optimal locations to transfer intangibles and perform core functions regardless of where end customers base. Consequently, digital businesses may be scaled considerably, reaching global customers without significant physical presence in local markets. This phenomenon is also known as "scale without mass". From a tax perspective, "scale without mass" challenges the principle of determining permanent establishment (PE) status through physical factors such as a fixed location.

c. Users play ever growing roles in value creation in the digital age. Users produce massive data for digital businesses by providing their personal data and user-generated contents mostly free of charge. Data are then processed and analysed to give insights to improve current products and services, or to personalise offerings to customers. Put simply, data from users add tremendous values to companies. The roles of data and user participation are ever more important in case of multi-sided markets,[1] say, search engines and social networks in the presence of both inter- and intragroup network effects. It should note that two-sided markets are not exclusive to the digital economy

[1] Two-sided markets, two-sided platforms, multi-sided markets and multi-sided platforms are interchangeable.

but digitalisation equips businesses with more tools to reach and connect two sides that may be located far from each other in a much more efficient way. The interaction between two sides of the market implies striking differences between two-sided markets and one-sided markets from a tax perspective. The next section will elaborate on two-sided platforms.

1.3. Digital two-sided markets

1.3.1. Definition

Evans and Schmalensee (2007, p.1) define two-sided markets as follows:

"These businesses serve distinct groups of customers who need each other in some way, and the core business of the two-sided platform is to provide a common (real or virtual) meeting place and to facilitate interactions between members of the two distinct customer groups."

They highlight situations in which two-sided platforms are likely to arise: interactions between the two groups generate externalities while transactions costs and free-riding problems prevent agents of the two groups from internalising such externalities by themselves. A two-sided platform then acts as an intermediary, providing a real or virtual place for the two groups to interact at a lower transaction price. Think of, for instance, advertising-financed media. Advertisers enjoy a large viewership to increase the probability of reaching their targeted customers. A search engine or a newspaper builds audience for advertisers by providing contents to viewers. Through advertising-financed media, advertisers can reach more customers at a lower price.

A key feature of two-sided platforms is the existence of indirect network effects (also, cross-group externalities or intergroup externalities). That is, the utility of customers of one group increases in the size of the other group. The larger the viewership is, the more likely advertisers will reach targeted audiences. It is worth noting that indirect network effects are not always positive, say, viewers may incur nuisance costs from the display of advertising.

In addition to indirect network effects, interactions between customers of the same group may give rise to direct network effects (also intragroup or within-group externalities). That is existing customers are affected by the participation of additional customers in their group. Similar to indirect network effects, direct network effects can be positive or negative. Take a social network (e.g., Facebook or Instagram) as an example. A social network is an

advertising-financed platform, serving two groups of customers: users and advertisers. Interactions between users generate positive direct network effects as they enjoy a large community. In contrast, on the side of advertisers, negative direct network effects arise from the participation of new advertisers which increases competition and makes the network less attractive. The presence of indirect and direct network effects affects decisions of platforms in terms of pricing and competition strategies, setting two-sided markets apart from one-sided markets (Rochet and Tirole, 2003).

1.3.2. Types of two-sided platforms

Evans and Schmalensee (2007) propose to divide two-sided platforms into four main types: advertising-financed platforms, transaction systems, exchanges and software platforms.[1]

Examples of advertising-financed platforms include newspapers, social networks and search engines. Typically, in order to raise the viewership, advertising-financed platforms provide users with free access or media products at close to or even below marginal costs. They earn most of their revenues from selling advertising to advertisers who are attracted by a wide audience.

Transaction systems such as Visa, Bitcoin, and PayPal provide a method for payment. In most cases, transaction systems derive most of their revenues from merchants on a transaction basis. Cardholders pay low annual membership fees but enjoy various rewards.

Exchanges, say, eBay, Booking.com, Wiley, and edX, help “buyers” and “sellers” search for feasible contracts and the best prices.[2] Exchanges can charge one side or both sides. For instance, eBay charges only sellers while auction houses charge both sides.

Finally, software platforms allow application developers and end users to interact. Examples include Mac OS, Android, and PlayStation. End-users of a software platform care about the supply of applications. Hence, the platform has an incentive to attract as many application developers as possible. To do so, it provides individual developers with an application

[1] With the evolution of the digital economy, the emergence of new business models is expected.

[2] The term “exchanges” covers a variety of business models including match makers (e.g., dating services or job agencies), brokerage services (e.g., insurance and real estate), person-to-person marketplaces to facilitate individual transactions (e.g., AirB&B or Uber), and crowdfunding platforms to link investors with entrepreneurs (e.g., Kickstarter or Crowdcube).

program interface (API), [1] thereby reducing the volume of codes and costs for them. On the other hand, another important concern for developers is the size of end-users. Therefore, to get both sides on board, a software platform tends to subsidize end-users by selling hardware (e.g., smartphones and game consoles) at a price below marginal costs. In exchange for such low access fees, end-users are charged high prices for games or applications.

1.3.3. Pricing and competition strategies in two-sided markets

A two-sided platform can charge two types of prices to customers: fixed access fees (or membership) for joining the platform, and transaction fees (or usage fees) for conducting transactions through the platform. The decision on what price to use depends on different factors. Think of, for instance, how a payment card charges its customers of both sides. Cardholders care about card acceptance while merchants care about usage. It thus makes sense to charge merchants for usage and charge consumers for access (Evans and Schmalensee, 2007). Rochet and Tirole (2006) show two motivations for a platform to charge fixed membership fees. First, the platform is unable to price the interaction properly since it may be unobservable. Second, fixed fees may be efficient to capture the surplus of end users.

The existence of indirect network effects causes a “chicken-and-egg” problem in two-sided markets (Caillaud and Jullien, 2003). That is to get agents in one group to join, the platform should already get a certain number of agents in the other group on board. In case of payment cards, for example, cardholders prefer the payment card which is accepted by a large number of merchants. At the same time, the participation of merchants depends on the base of existing cardholders. A tricky question is then how the platform can design its price structure to get both sides on board.

Rochet and Tirole (2006) show that indirect network effects render the price structure in two-sided markets non-neutral, that is, a price reallocation between two sides has impact on

[1] An API is a set of routines, protocols and tools for building software applications. By providing all the building blocks, an API helps programmer develop applications without any need to duplicate common codes.

economic outcomes.[1] Put another way, it is not the total price but rather the price structure that matters (Rochet and Tirole, 2006, p.665):

"A market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount."

Belleflamme and Peitz (2015, p. 665) find that:

"In a market with a single intermediary [a monopoly platform] who charges membership fees, the side of the market which exerts the larger external benefit on the other tends to face lower membership fees. A profit-maximizing intermediary may subsidize one side of the market so as to generate a higher volume of trade and thus, higher profits on the other side of the market."

Subsidizing means the platform charges customers at a price lower than marginal costs. This price may be zero or even negative (i.e., the platform may pay customers for their participation). The subsidized side is one which exerts the larger cross-group externalities on the other side. In short, the finding of Belleflamme and Peitz (2015) implies that a monopoly platform can maximize its profits by giving free access to users.

When there exists competition between platforms, whether customers are single-homing or multi-homing affects their price strategies. "Single-homing" means customers join at most a platform while "multi-homing" means they can simultaneously participate in two or more similar platforms. In case of search engines such as Google, the user is the single-home side who tends to search on only one platform. In contrast, the advertiser is the multi-home side who prefers to place their ads on different platforms to reach the maximal number of potential customers.

Caillaud and Jullien (2003) find that where customers of both sides are single-homing, there exists the so-called winner-takes-all phenomenon. Consider the situation where two platforms X and Y compete for customers of two groups A and B, labelled C_A and C_B. C_A and C_B are both single-homing. If a C_A leaves platform X, single-homing means this

[1] If a change in the price structure is internalised by the two sides of the market, the price structure is neutral, and the total price matters while the price allocation becomes irrelevant (Belleflamme and Peitz, 2015)

customer will join platform Y. As C_A exert positive indirect network effects on C_B, platform X is likely to experience a reduction in the number of customers in group B. Then, to maximize the participation of both sides, the dominant platform may provide customers on both sides with free access but charging the maximal transaction fees.

The pricing strategy changes significantly if one side is multi-homing.[1] For the sake of illustration, the above setting is modified with C_A being sing-homing while C_B now being multi-homing. Belleflamme & Peitz (2015) show that a C_B lost to X is not a C_B gained by Y; in contrast, a C_A lost to X is a C_A gained by Y. Consequently, the platforms compete for C_A - customers who singlehome. This explains why single-homing customers may enjoy low or even negative access prices while multi-homing customers are charged at prices above costs. This can be seen in the case of search engines. Users who are single-homing enjoy free access while advertisers who are multi-homing bear transactions fees (i.e., pay-per-click).

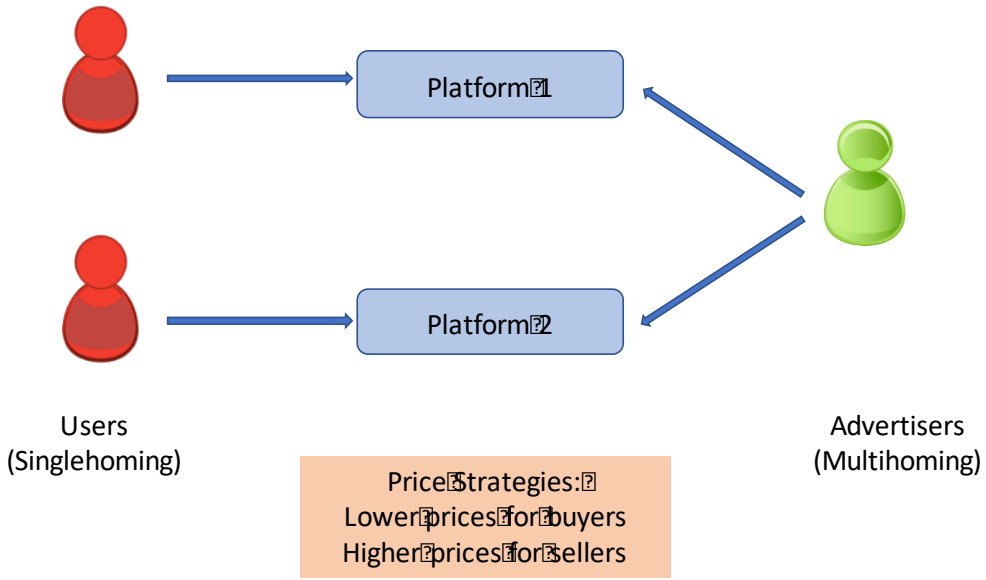

Figure 1: Single-homing and multi-homing (Belleflame and Peitz, 2015)

The analysis so far shows that free access that many digital platforms give to users should be considered as a part of their profit-maximizing price strategy – that is to have a sufficient

[1] The general objective of two-sided platforms is to maximize the matching between two sides. Then if one side is multi-homing, the other side gains nothing to multihome. Put simply, at most one side is multi-homing.

number of them on board to attract customers on the other side. In this sense, it is questionable to view free access as what a platform pays users for their provision of data.

Another interesting question relates to the effect of a price increase for one side in light of indirect network effects. This is examined by Evans and Schmalensee (2007). Assume a platform serves two distinct groups A and B. Q^i and P^i denote, respectively, the participation of and the price for customers in group i with $i = A, B$. The participation of customers in group i depends both on price charged to them, P^i, and the participation of customers in the other group, Q^j, with $i, j = A, B$.

The demand functions for the two groups are given as: $Q^A(P^A, Q^B)$ and $Q^B(P^B, Q^A)$. Suppose the platform already sets price for each group at P^A and P^B. Holding the price for and the participation of the other side constant, a price increase for group i results in a change in the participation of this group. This change depends on the price elasticity of demand for this group:

$$e^i = -\frac{P^i}{Q^i} . \frac{\partial Q^i}{\partial P^i} \; with \; i = A, B \; (1)$$

Indirect network effects mean that a change in the size of group i affects the participation of group j at the current price P^j with $i, j = A, B$:

$$\theta_i^j = \frac{Q^i}{Q^j} \frac{\partial Q^j}{\partial Q^i} with \; i, j = A, B \; (2)$$

Note that at least one of θ_i^j is positive in case of two-sided platforms. A change in the participation of group j in turn affects the participation of group i. In other words, there is a feedback loop between the two sides.

The total effect of a price increase for group i on its participation is given by:

$$E^i = -\frac{P^i}{Q^i} . \frac{dQ^i}{dP^i} \; with \; i = A, B (3)$$

To see the link between e^i, θ_i^j and E^i, differentiate both demand functions totally with respect to either price:

$$\frac{dQ^i}{dP^i} = \frac{\partial Q^i}{\partial P^i} . \frac{dP^i}{dP^i} + \frac{\partial Q^i}{\partial Q^j} . \frac{dQ^j}{dP^i} = \frac{\partial Q^i}{\partial P^i} + \frac{\partial Q^i}{\partial Q^j} . \frac{dQ^j}{dP^i}; i, j = A, B \; (4a)$$

$$\frac{dQ^j}{dP^i} = \frac{\partial Q^j}{\partial P^j} \cdot \frac{dP^j}{dP^i} + \frac{\partial Q^j}{\partial Q^i} \cdot \frac{dQ^i}{dP^i} = \frac{\partial Q^j}{\partial Q^i} \cdot \frac{dQ^i}{dP^i}; i, j = A, B \ (4b)^1$$

Insert (4b) into (4a) and solve, we have:

$$\frac{dQ^i}{dP^i} = \frac{\frac{\partial Q^i}{\partial P^i}}{1 - \frac{\partial Q^i}{\partial Q^j} \cdot \frac{\partial Q^j}{\partial Q^i}}; i, j = A, B \ (5)$$

From (1), (2), (3) and (5), we have:

$$E^i = \frac{e^i}{(1 - \theta_i^j \theta_j^i)}; i, j = A, B$$

To sum up, a price increase for one side reduces the demand on this side due to its own price elasticity of demand and affects the demands for both sides due to indirect network effects.

Understanding pricing and competition strategies of two-sided markets is the key to examining how platforms may respond to different tax instruments. The following part is a summary of literature on taxation in two-sided markets.

1.3.4. Literature on taxation in two-sided markets

The literature on taxation in two-sided markets is quite scarce. The presence of network effects leads to counterintuitive effects of taxes in two-sided markets compared to one-sided markets.

In one-sided markets, a tax increase typically leads to a higher price and thereby reduces the demand for the taxed good. Kind, Koethenbuerger and Schjelderup (2010) find that this result need not hold in the presence of the two-sidedness by examining how a monopoly media platform (i.e., a newspaper) may respond to a tax change. Their most important finding is that a higher *ad valorem* tax[2] on sales of newspaper may lead to lower prices for and higher sales of both newspaper and advertising. The rationale is that reducing the price of newspaper results in larger readership which attracts more advertisers and thereby spurs sales of advertising. The price of advertising depends on a trade-off between price

[1] Note that P^A and P^B are independent and then $\frac{dP^j}{dP^i}$ is equal to zero

[2] An *ad valorem* tax is a tax on the value of transactions.

enhancing effects of wider readership and price reducing effects of incremental volume of advertising sales. Put generally, *"a two-sided platform firm can reduce its tax burden by shifting revenue to the side of the market where the tax rate is unchanged" (*Kind et al., 2010, p.770). Another conclusion is that a higher unit tax[1] on newspaper sales unambiguously lowers output of both newspaper and advertising as there is a direct relationship between quantity and tax payments.

Kind and Koethenbuerger (2018) extend the study of Kind et al. (2010) by exploring the effect of a tax on advertising sales. Such a tax affects the platform in a more complicated way. Denote P_N and P_A as the price of newspaper and of advertising, respectively. Denote Q_N and Q_A as the quantity of newspaper and advertising, respectively. In most cases, readers are ad-averse and their willingness to pay for the newspaper reduces in the advertising level, that is $\frac{\partial P_N}{\partial Q_A} < 0$. This explains why the marginal profitability of selling newspapers $\frac{\partial \pi}{\partial Q_N}$ is expected to decrease in Q_A where π is denoted the profits of the platform. Put another way, $\frac{\frac{\partial \pi}{\partial Q_N}}{Q_A} < 0$. However, the authors show that depending on the elasticity of $\frac{\partial P_N}{\partial Q_A}$ with respect to Q_N and the elasticity of $\frac{\partial P_A}{\partial Q_N}$ with respect to Q_A, $\frac{\frac{\partial \pi}{\partial Q_N}}{Q_A}$ can be positive. This implies the sign of $\frac{\frac{\partial \pi}{\partial Q_N}}{Q_A}$ is ambiguous.

Determining the sign of $\frac{\frac{\partial \pi}{\partial Q_N}}{Q_A}$ is of relevance to determine how the volume of advertising changes with a tax on advertising. As this term is probably positive, there exists the situation where the volume of advertising probably rises with an *ad valorem* tax on advertising revenues. Applying this finding to a digital media platform that typically gives users free access, they conclude that an *ad valorem* tax on advertising sales leads to higher sales of advertising. The opposite effect is expected from a unit tax on advertising revenues.

Bourreau, Caillaud, and De Nijs (2018) study the effect on fiscal revenues of different types of taxation, including a tax on data collection as well as a unit tax and an *ad valorem* tax on subscription fees and advertising revenues. A tax on data collection dissuades the platform from collecting too many data, thereby decreasing the volume of ad-generated transactions

[1] A unit tax (also known as specific tax or excise tax) is a tax on quantities of transactions.

and then tax revenues from VAT. If the VAT rate is large enough, this loss from VAT revenues may outweigh the incremental revenues from a tax on data collection. The similar effect is expected from the use of a unit tax on advertising. Nevertheless, in some cases, an *ad valorem* tax on subscription fees or on advertising may raise fiscal revenues and welfare, irrespective of the VAT rate. The above findings of Kind et al. (2010) and (2018) show that an *ad valorem* tax on either side results in an increase in sales of both sides and then such a tax generates additional tax revenues without a decrease in VAT proceeds.

As mentioned earlier, there are two types of interactions in a digital platform: access and transaction. Buying digital devices (smart phone or game consoles) and paying membership are examples of how to access to a platform. Paying for clicks on advertising or applications are examples of transactions through a two-sided platform.

Belleflamme and Toulemonde (2018) set up two settings to examine the tax incidence of different taxes in case of two-sided competing platforms. One setting is with symmetric taxes, i.e., two platforms are taxed in a non-discriminatory way and taxes only affect equilibrium prices but leave equilibrium participations unchanged. The other setting is with asymmetric taxes, implying changes in both equilibrium prices and participations.

In the first setting, they find that a unit tax on access is entirely borne by the levied side. In contrast, an *ad valorem* tax on access benefits the taxed side while hurting the other side. It is because of the existence of positive cross-group externalities. Suppose there are two sides in the market, A and B. Each side values the participation of the other side. An *ad valorem* tax on access is imposed on side A. Unlike in one-sided markets, the two-sided platform has less incentive to raise the price for A to pass the tax burden because a reduction in the size of A discourages the participation of side B. On the contrary, A may be charged a smaller price. Although a lower price for B can attract more customers and then generate revenues from side A, the platform has no incentive to do so because the revenue from A is taxed.

An *ad valorem* tax on transaction weakens the externalities and then benefits the platform. The reason is that *"as external effects weaken, either side becomes less valuable for platforms, which relaxes price competition and increases profits"* (Belleflamme and Toulemonde, 2018, p.15). Both sides get hurt because *"the tax on their side directly reduces their utility from interaction on the platform, while the tax on the other side raises their access fee to the platform"* (Belleflamme and Toulemonde, 2018, p.15).

In the second setting, they focus only on a unit tax and find that such a tax benefits the untaxed side and at least one platform. The effect on the taxed side, however, is ambiguous.

With regard to the relationship between taxation and data collection, Bloch and Demange (2018) explore the effect of taxation on data collection. They find that the only way to correct excessive data collection is to apply a higher tax rate on revenues related to data collection (resales of data to a third-party) than on revenues from one-time used data (e.g., revenue from auction for keywords), such that the platform is deterred from exploiting data.

Tax competition in two-sided markets is clearly underexplored. To my best knowledge, there is no other work but the article of Kotsogiannis and Serfes (2010) examining the effects of cross-side externalities on tax competition between countries. They set up a model as follows: There are two distinct groups: shoppers and firms. Shoppers value a variety of products, i.e., they prefer to shop in the jurisdiction which has more firms. However, they incur transportation costs when shopping far away from their location. Firms prefer to locate in the jurisdiction with more customers. Since shoppers value a larger number of firms, existing firms in a jurisdiction benefit from an additional firm. In other words, the interaction between firms and shoppers exhibits positive cross-group externalities and there exists a positive intra-group externality among firms as well. The presence of the cross-group externalities leads to the vertical differentiation, that is jurisdictions choose different public good investments. If the externalities are strong enough, most of the firms intend to locate in the jurisdiction with higher public goods and the stronger the externalities are, the higher tax rate this jurisdiction imposes.

2. New challenges to international taxation

2.1. Google case – Example of a digital two-sided platform with aggressive tax planning[1]

In this part, I describe Google's business model to illustrate how digital two-sided platforms operate. Also, Google's tax planning arrangement is examined to demonstrate how tax planning opportunities may arise from digitalisation.

[1] After the organisational restructure in October 2015, Google Inc. was renamed Alphabet Inc., a new public holding company. Since then Google is one segment of Alphabet Inc. and accounted for 99.1% of the consolidated revenues in 2016. Google and Alphabet are interchangeable in this thesis.

Google's search engine service: A two-sided platform

Online advertising is the main source of Google's revenue. In 2016, advertising revenues reached over $79 billion, representing 88.8% of its total revenues. Google serves two distinct groups: users and advertisers. Like traditional media such as printed newspapers or TV, Google has an incentive to build a wide audience to attract advertisers by providing many online services free of charge for users. Advertisers value a large base of viewers to increase the likelihood of matching.

Google uses a "keyword bidding system". Advertisers bid on keywords; a higher bid price generally secures a better slot. Google earns revenues on the basis of the number of clicks (pay-per-click) – that is advertisers only pay when a user clicks on their ads. Accordingly, the platform cares about Click-through-rate that measures the ratio of clicks to the total views on an advertisement. In order to maximize its advertising revenues, Google aims to deliver highly relevant ads to individual users, inducing them to click on the ads. The relevance is determined by the quality of advertisements, i.e., the way advertisers describe their products and services by using precise keywords. That explains why Google allocates slots to bidders not only based on the bid price but also on the quality of advertisements. (Evans, 2011)

From the perspective of advertisers, successfully delivering relevant ads implies that their ads can reach targeted audiences. A higher compatibility between the ad and the users' search leads to higher sales. Accordingly, advertisers are more willing to put a higher price per click (He and Chen, 2011 and Atheyand Ellison, 2011).

Google is able to deliver customized relevant ads to individual users in real time thanks to the nature of Internet communication and the data base collected from users (Evans, 2011). Google is estimated to have one billion monthly active users for each of its core products. Through their search on Google's own sites such as Google Search or Google Maps, users give Google information on their location, interest and preference. User data are then processed and analysed by its sophisticated algorithm such that users see advertisements relevant to their interest and click on them.

To sum up, data and user participation play a key role in Google's business model; users exert positive cross-group externalities on advertisers. In contrast, the participation of

advertisers generates negative effects as users incur nuisance costs from the display of ads. Google's business model can be demonstrated by the following figure:

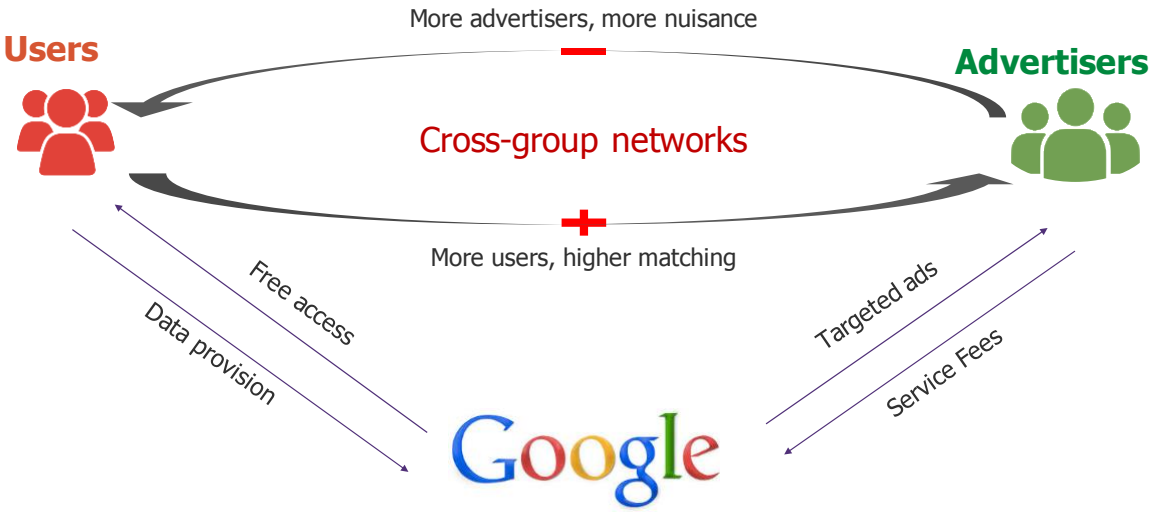

Figure 2: Google's business model

Google operates around the world. In 2006, its revenues from the U.S., the United Kingdom, and the rest of the world were $42.8 billion, $7.8 billion, and $39.7 billion, respectively. While the international revenues accounted for 52.61% of the total revenues, the long-lived assets outside the U.S. represented only 23.69%. It implies the so-called "scale without mass" phenomenon in the digital economy - that is digitalisation allows businesses to reach global customers without relocation.

Income from continuing operations before income taxes included income from domestic operations of $12,020 million and income from foreign operations of $12,130 million in 2016. Most of the income from foreign operations was earned by Google Ireland Holdings. Thanks to foreign operations, Google enjoyed a global effective tax rate of 19%, much lower than that of 35% in the U.S.

Google's Tax Planning - The Double Irish with Dutch Sandwich

Google has been able to minimize its overall tax liability by employing an infamous tax avoidance scheme named "The Double Irish with Dutch Sandwich". The scheme involves the use of two Irish companies and a Dutch company, taking advantage of the Irish tax law to transfer profits to Bermuda - a tax haven where the corporate tax is zero. The tax arrangement used by Google is as follows: in 2006, Google reached an Advance Pricing

Agreement (APA)[1] with Internal Revenue Service (IRS)[2] to transfer the rights to its search and advertising technology to a unit called Google Ireland Holdings, a dual resident subsidiary which is incorporated in Ireland but effectively managed in Bermuda. The Irish tax code considers Google Ireland Holdings as a Bermuda company while the U.S. views it as an Irish company.[3] The technology rights were acquired by Google Ireland Holdings under a cost-sharing arrangement.[4]

Google Ireland Holdings then licenses all the rights to the technology to another subsidiary in the Netherlands who has neither employees nor economic activities except for board meetings in an "office hotel". Google Netherlands Holding B.V. then sublicenses to Google Ireland Limited – the second entity incorporated in Ireland and earns modest profits. At the end of the day, most of the royalties paid by Google Ireland Limited to Google Netherlands Holding B.V. come back to Google Ireland Holdings. The reason why Google makes a detour to the subsidiary in the Netherlands first is to avoid withholding tax on royalties in Ireland. If Google Ireland Limited paid royalties directly to Google Ireland Holdings, such income would be imposed a withholding tax of 20% before being shifting into Bermuda. [5] Unlike Ireland, the Netherlands do not charge a withholding tax on royalty scheme; royalties paid to Google Ireland Holdings from Google Netherlands Holding B.V. and then transferred to Bermuda are not subject to any withholding tax.

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[1]An APA is an agreement between a tax payer and the tax authority. It determines the transfer pricing methodology for pricing the tax payer's international transactions for future years. The methodology is to be applied for a certain period of time based on the fulfilment of certain terms and conditions (called critical assumptions). An APA can be unilateral, bilateral, or multilateral (Deloitte, 2012).

[2] The IRS is the American tax administrator, aiming to help America's taxpayers understand the tax law and to ensure everyone to pay their fair tax share as well.

[3] The residency country is where the company is incorporated under the U.S. tax rules while it is where the company is managed and controlled under the Irish tax law.

[4] Under a cost sharing arrangement, the parties agree to share the costs of development of one or more intangibles in proportion to their shares of reasonably anticipated benefits from their individual exploitation of the interests in the intangibles assigned to them.

[5] Under the Interest and Royalty Directive (2003/49/EC), where certain conditions are satisfied, interest and royalty payments made by an Irish tax resident company to a company resident in another EU Member State or Switzerland are not subject to withholding tax. To be eligible to an exemption from withholding tax, the Irish company and the receiving company must be "associated companies", i.e. for a continuous period of two years, one company controls 25% of the voting power of the other, or both are 25% controlled by a third company. As Bermuda is not a EU Member State, royalties transferred to Bermuda are then subject to withholding tax in Ireland.

Google Ireland Holdings is a controlled foreign corporation (CFC) and then its royalty income should be subject to tax in the U.S. according to the U.S. anti-tax haven rules of Subpart F provisions.[1] However, as Google Netherlands Holding B.V. elects its classification as a disregarded entity, the check-the-box rules ignore its transactions with Google Ireland Holdings. The income of Google Ireland Holdings, then, is not treated as passive income and is eligible to be deferred from U.S. tax until dividends are repatriated to the U.S shareholders.

In contrast to Google Ireland Holdings and Google Netherlands Holding B.V., Google Ireland Limited employs a substantial number of people (3080 employees as of 2016), sells advertising and serves as the legal counterparty to conclude contracts with advertising clients outside the U.S.[2] The maintenance or other activities are not operated only by this subsidiary. Instead, thanks to the ability to locate the servers throughout the region and/ or even in the U.S., different members of the group may share responsibility for maintaining the websites or ensuring the system to operate properly.

In fact, Google establishes local subsidiaries in large markets to promote its advertising business. Local staff members are mainly responsible for directly interacting with potential advertising clients. They provide educational and technical support, as well as improve marketing to stimulate demand for advertising in local markets. In many cases, without any further contact with Google Ireland Limited, local staff may convince clients to conclude contracts. The sales, however, are not treated as revenues of local subsidiaries. Rather, Google Ireland Limited is entitled to advertising revenues since it owns legal rights to conclude contracts. Local subsidiaries earn small mark-ups for the services they perform.[3]

Google Ireland Limited is not considered to have a PE in any local markets and hence its profits are subject to tax only in Ireland at a lower rate than in most other market

[1] Generally, income of a foreign corporation is deferred until the income is repatriated to its U.S. shareholders under the U.S. tax law. The Subpart F provisions eliminate such deferral of U.S. tax on movable income (or passive income) such as dividends, interest, rents and royalties (Internal Revenue Service, 2014).

[2] Google Ireland Limited records most of the revenues of Google outside the U.S. ($26,287 million in 2016) but has a small earning before tax margin (5% in 2016).

[3] For example, Google UK. hires 2943 employees, a little smaller number compared to that of Google Ireland Limited (3080) but the revenues recorded by two subsidiaries in 2016 are EUR 26,287 million and EUR 1,260 million, respectively.

jurisdictions (See corporate tax rates in Europe in Appendix 1). A local tax authority is entitled to tax on the corresponding subsidiary's compensation which accounts for a small part of Google's total revenues. The following graph illustrates Google's tax strategy:

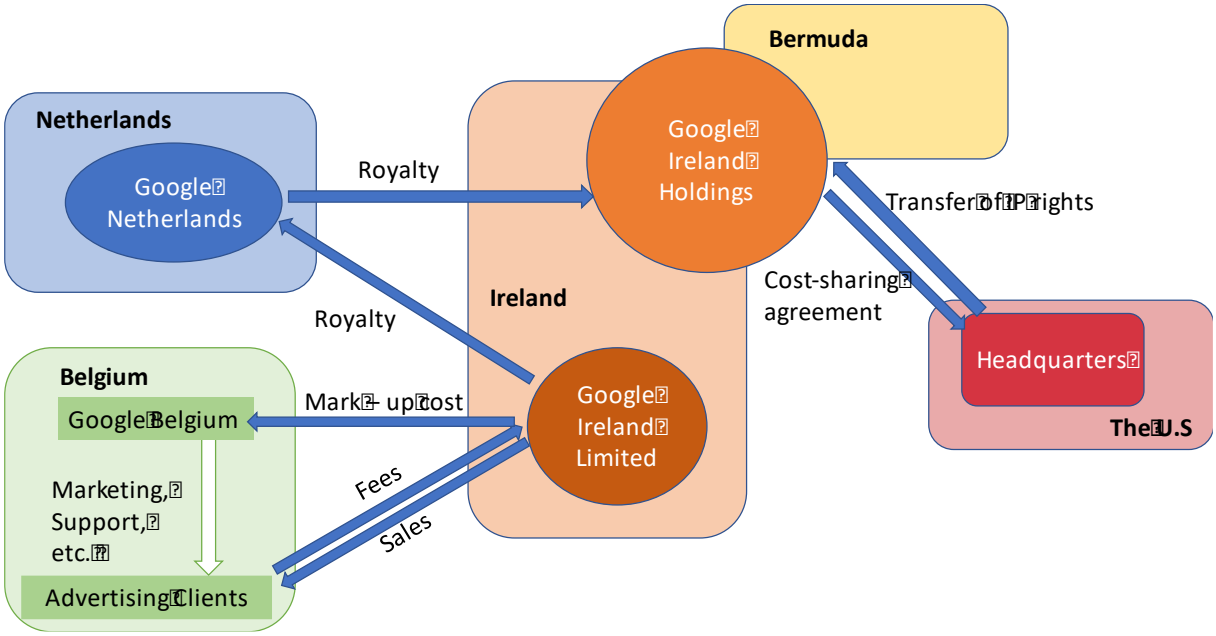

Figure 3: Double Irish Dutch Sandwich Scheme

As can be seen from the above analysis, data and user participation contribute significantly to Google's advertising business. Nevertheless, the current tax rules ignore their contribution when it comes to distribute Google's profits across the involved countries.

While a comprehensive solution to tackle such a tax arrangement is unlikely to see the light of the day in the near future, many countries have taken various coordinated and unilateral measures to mitigate its adverse impacts on their national tax revenue (OECD, 2018). The following section presents the current tax practices related to digital taxation, including the interim measure introduced in a Digital Tax Package by the EU in March 2018.

2.2. Fundamentals of international taxation

International taxation addresses two main questions: how to determine taxing rights (also known as the nexus problem), and how to allocate multinational profits across countries.

2.2.1. Determination of taxing rights (nexus rules)

The cross-border operation of MNEs poses two challenges to domestic tax rules. The first issue relates to how to tax outbound investments of resident companies, and the other is how to tax inbound investments of non-resident companies (OECD, 2015a).

There are two broad systems to address outbound investments of resident companies: the worldwide system and the territorial system. Under the worldwide system, resident companies are taxed on their income both from domestic and foreign sources. Hence determining the residence of a company is critically important. In contrast, determining the source of business income is key under the territorial system because only their domestic income is subject to tax in their resident country under this system.

Regarding the taxation of non-resident companies, a country is entitled to tax a non-resident enterprise if this enterprise is considered to have a PE in this country. Only the profits that are attributable to the PE is subject to tax therein. Paragraph 1 of Article 7 of the OECD Model Tax Convention states:

"Profits of an enterprise of a Contracting State shall be taxable only in that State unless the enterprise carries on business in the other Contracting State through a PE situated therein. If the enterprise carries on business as aforesaid, the profits that are attributable to the PE in accordance with the provisions of paragraph 2 may be taxed in that other State."

The definition of PE can be found in Article 5 of the OECD Model Tax Convention. An enterprise can be deemed PE status in the host country in two cases. The first case is if it has a fixed place through which the business of the enterprise is wholly or partly carried on as mentioned in Paragraph 1:

"For the purposes of this Convention, the term "PE" means a fixed place of business through which the business of an enterprise is wholly or partly carried on."

The second one is if there is a dependent agent acting on behalf of the foreign enterprise, and habitually exercising an authority to conclude contracts in the name of the foreign enterprise as mentioned in Paragraph 5:

"A person – rather than an agent of an independent status to whom paragraph 6 applies — is acting on behalf of an enterprise and has, and habitually exercises, in a Contracting State an authority to conclude contracts in the name of the enterprise, that enterprise shall be

deemed to have a PE in that State in respect of any activities which that person undertakes for the enterprise, unless the activities of such person are limited to those mentioned in paragraph 4 which, if exercised through a fixed place of business, would not make this fixed place of business a PE under the provisions of that paragraph."

Generally, PE status is determined based on a certain level of physical presence in a country. Importantly, as can be seen from Article 5(4) of the OECD Model Tax Convention, there are specific-activity exceptions to PE status if activities are viewed as auxiliary or preparatory such as storage, display or delivery of goods.

2.2.2. Profit Allocation

The second issue of international taxation is how to allocate global profits of an MNE among the associated entities, aligning taxation and value creation. The current practices rely on the arm's length principle. The definition of the arm's length principle can be found in Paragraph 1 of Article 9 of the OECD Model Tax Convention:

"[Where] conditions are made or imposed between the two [associated] enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which would, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly"

Put simply, transactions between associated entities (also called controlled transactions) have to be priced as if they were between independent companies (or uncontrolled transactions) under comparable conditions. The rationale behind the arm's length principle is to ensure an equal footing between inseparable entities of an MNE and separate companies in terms of taxation.

The OECD provides five different transfer pricing methods to determine whether the arm's length principle is satisfied. They are divided into two broad categories: traditional transaction methods or transactional profit methods. Traditional transaction methods include the comparable uncontrolled price method (CUP), the resale price method (RPM), and the cost-plus method (CPM). Transactional profit methods are the transactional net margin method (TNMM) and the transactional profit split method (TPSM).

The transfer pricing method is selected on a case-by-case basis taking into account the following requirements which can be found in Paragraph 2.2 of the OECD Transfer Pricing Guidelines:

i. the respective strengths and weaknesses of the OECD recognised methods;
ii. the appropriateness of the method considered in view of the nature of the controlled transaction, determined in particular through a functional analysis;
iii. the availability of reliable information (in particular on uncontrolled comparables) needed to apply the selected method and/or other methods;
iv. and the degree of comparability between controlled and uncontrolled transactions, including the reliability of comparability adjustments that may be needed to eliminate material differences between them.

Under the three traditional transaction methods and the transactional net margin method, the price or profit margin from controlled transactions is compared with the price or profit margin from comparable uncontrolled transactions to determine the arm's length price. They are called one-sided methods because only one of the involved parties is examined (the "tested" party).

Among the one-sided methods, the level of comparability between controlled transactions and uncontrolled transaction is measured chiefly based on two dimensions: product comparability and business function comparability. The comparability is required to various degree from method to method. If there are material differences between controlled and uncontrolled transactions, adjustments are needed. There are two types of comparables: internal comparables relate to comparable uncontrolled transactions of the same tax payer; external comparables relate to comparable uncontrolled transactions of an independent enterprise. Internal comparables are preferable to external comparables, giving a higher level of comparability. While the comparable uncontrolled price method is the most direct and reliable, it requires the highest level of product comparability. In contrast, the transactional net margin method provides the most flexibility because it gives more weights on functional comparability than on product comparability.

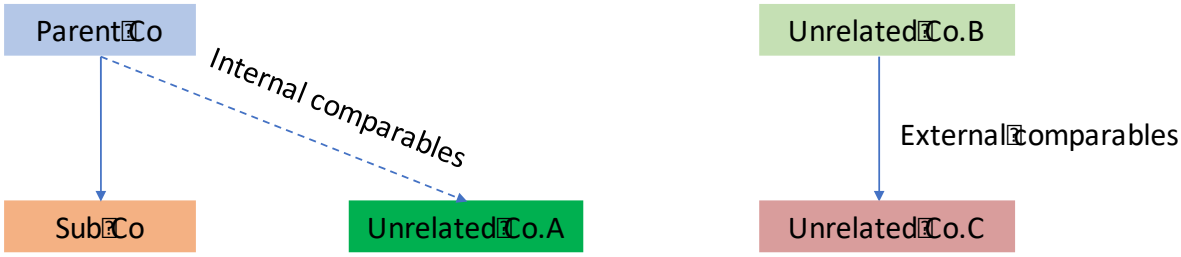

Figure 4: Internal and External Comparables

The transactional net margin method employs net profit margin as benchmark other than gross profit margin, thereby making it more applicable. Net profit margin is calculated after subtracting direct costs,[1] indirect costs[2] and operating costs[3] while gross profit margin uses profits after only direct costs and indirect costs. Since the classification of costs varies with different accounting practices and accordingly if the former is used, fewer adjustments are needed.

In case of unique transactions or highly integrated businesses, the transactional profit split method is used. First, the combined operating profits from an inter-company transaction are calculated. Such profits are then split among the involved entities based on a functional analysis, and the approximates of the division of profits that would have been anticipated and reflected in an agreement made at arm's length. Unlike the one-sided methods, the transactional profit split method requires to evaluate the contributions of all the involved enterprises. It requires to access information of all associated enterprises, adjusting accounting practices and currencies when combining revenues and costs. Plus, the splitting factors are determined on a case-by-case basis. Although the transactional profit split is more complicated than the other methods, it is expected to be more popular in light of increasingly heavy reliance on intangibles and a growing degree of integration in the digital economy. In fact, the OECD has paid more attention to ensure the transactional profit split to work in a more efficient and effective way.

[1] Direct costs are costs of producing a particular product or service, such as the cost of raw materials.

[2] Indirect costs closely relate to the production process but are common to several products or services.

[3] Operating expenses of the enterprise as a whole (supervisory, general, and administrative expenses)

The table below is a summary of the different transfer pricing methods in terms of the approach and benchmark used, how to determine comparables, typical situations and difficulties to apply:

Methods	Approach	Benchmark	Attributes to comparability	Typical cases	Difficulties
CUP	Compare to the price in a comparable uncontrolled transaction in comparable circumstances	Prices or quoted prices	Very high level of product comparability and medium level of function comparability	Commodities	Limited comparables
RPM	Reduced an appropriate gross margin on the price at which a product that has been purchased from an associated enterprise is resold to an independent enterprise	Gross profit margin on sales	High level of product comparability and medium level of function comparability	Marketing operations (distributors of finished commodities)	Adjustments needed to ensure comparable gross profit margin (same classification of costs)
CPLM	An appropriate cost plus mark-up is then added to the costs	Gross profit margin on costs	High level of product comparability and high level of function comparability	Semi-finished goods or services	Hard to determine costs Adjustments needed to ensure comparable gross profit margin (same classification of costs)
TNMM	Examines net operating profit from transactions as a percentage of a certain base in respect of similar parties	Net profit margin (can use different bases i.e. costs, turnover, etc.)	Medium level of product comparability and very high level of function comparability	Any type except when each party makes unique and valuable contributions	Lower reliability
TPSM	Calculates the combined operating profit resulting from an inter-company transaction Then splits those combined profits based on the approximates of the division of profits that would have been anticipated and reflected in an agreement made at arm's length	The division of profits of independent parties or the division of functions between the associated enterprises themselves.	Medium level of product comparability and very high level of function comparability	When each party makes unique and valuable contributions or highly integrated operations	Require a lot of information Hard to measure combined revenues and costs Hard to split combined net profits

2.3. Challenges arising from digitalisation

Although digitalisation is the key to economic development, it comes with serious challenges from an international taxation perspective. Although no new Base Erosion and Profit Shifting (BEPS) practices arise from digitalisation, the current BEPS practices are exacerbated by virtue of remote and centralised operations in the digital economy (OECD, 2015a).

BEPS refers to harmful tax practices used by cross-border businesses. The aim is to artificially strip tax base of high-tax countries and shift profits to low or no-tax locations by exploiting gaps and mismatches in tax rules between jurisdictions. Most of them, however, are not illegal. Three main BEPS issues related to digitalisation are highlighted in the 2018 Interim Report on Action 1 of the OECD. The first issue is the artificial avoidance of PE status. The second one is misalignment between transfer price outcomes and value creation. The last issue relates to tax avoidance in the residence country by exploiting the lack of robust (CFC) rules.

2.3.1. The artificial avoidance of PE status

Currently, the determination of PE status heavily depends on physical presence. Digitalisation renders such a paradigm obsolete. Intangibles are at the center of the digital economy, facilitating remote sales from a central location. Put differently, businesses can approach global customers without requirements for relocation to market jurisdictions; substantive economic activities in local markets can be established and maintained through the Internet.

Another common practice is to exploit the exceptions to PE status under Article 5(4) by fragmenting the operations. A cohesive operating business is broken down into several small operations so that each part is merely engaged in preparatory or auxiliary activities.

There are situations where an MNE remains to have PE status in a market jurisdiction but pays a small amount of tax therein. The arrangement is as follows: the MNE sets up local subsidiaries in large markets to directly interact with local clients. It remains to keep intangibles assets and centralise core functions in the parent or a regional centre in a low tax country. This implies the authority to conclude contracts is assumed by this entity. Local staff provide clients with educational and technical support, as well as improve marketing to stimulate demand in local markets. In many cases, local staff may convince clients to

conclude contracts without any further support from the parent or the regional centre. However, the functions performed by local staff are considered as routine. Local subsidiaries then receive only a small mark-up over the costs for their services. The authority to conclude contracts means all revenues are treated as revenues of the parent or the regional centre even when it does not make any material modifications to conclude contracts. Its profits are subject to taxation only in the low-tax country as this entity has PE status nowhere but in this country. In short, the MNE enjoys a low tax rate on most profits from such an arrangement.

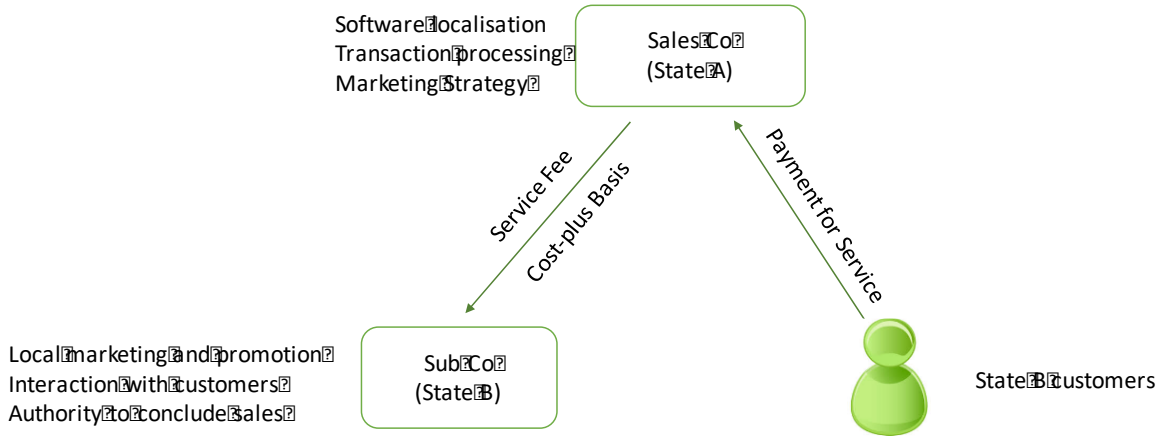

Figure 5:
Scenario involving the avoidance of PE status (OECD, 2018a, p.93)

2.3.2. Misalignment between transfer pricing outcomes and value creation

Currently, the attribution of profits from the exploitation of intangibles across the involved entities is primarily based on the legal ownership of such assets, the risks assumed and the financing provided. Hence, MNEs have an incentive to transfer the rights to intangibles which were initially developed in a high-tax country to another entity in a low-tax country which is normally a holding company providing capitals to the whole group. The transfer typically takes place at a low price because there is an insufficient performance track record of intangibles at the time of transaction. By claiming the legal ownership and providing most financing for the development and maintenance of intangibles, this holding company is attributed most of the profits from the exploitation of such assets irrespective of whether it is effectively involved in the performance of the development, enhancement, maintenance, protection or exploitation (DEMPE) functions related to those intangibles:

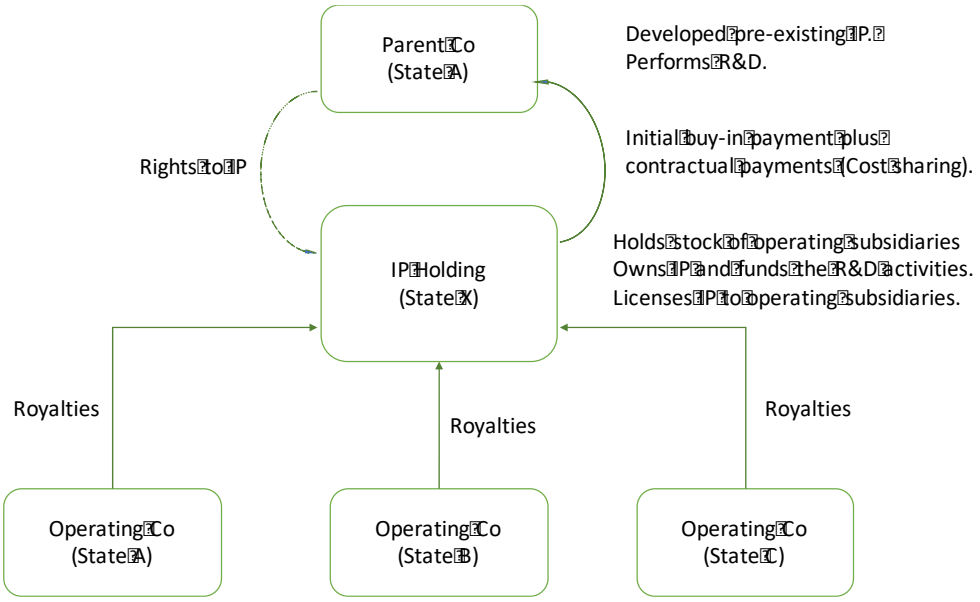

Figure 6:
Scenario involving a cash box not performing any DEMPE functions (OECD, 2018a, p.98)

2.3.3. Exploiting the lack of robust CFC rules

CFC rules generally apply to foreign companies that are controlled by shareholders in the parent jurisdiction. CFC rules address the risk that an MNE has an incentive to set up a CFC in a low-tax country with a view to stripping the tax base of the residence country and/or other market countries by shifting income into that CFC. Without CFC rules in place, the presence of CFCs provides BEPS opportunities (OECD, 2015c).

Not every country has CFC rules and where they exist, CFC rules significantly vary from country to country (OECD, 2018a). In most cases, many CFC rules only apply to certain income categories which are mobile and then easily shifted into a low-tax jurisdiction, regardless of where it was earned.

If the parent entity is located in a high-tax jurisdiction, digital businesses tend to move intangibles out of the parent entity, setting up a cash-rich subsidiary in a tax-favoured country and then transferring all intangibles into that subsidiary. This subsidiary can conclude contracts with clients from different market jurisdictions through the Internet. If CFC rules exist to control over such mobile income from remote sales, profits generated by this subsidiary are partly subject to taxation in the residence country of the parent entity. Otherwise, all profits are then taxed only in the low-tax country, leading to a low tax bill for the MNE.

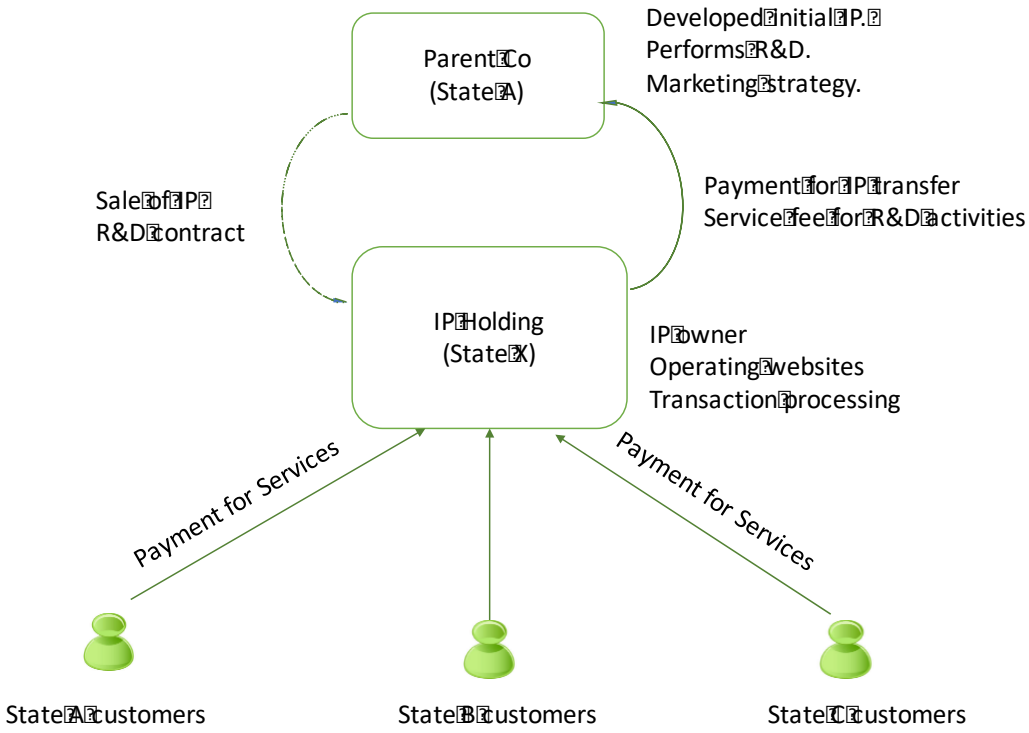

Figure 7: BEPS practice in the absence of CFC rules (OECD, 2018a, p.99)

3. The OECD's response

In the course of the OECD's BEPS Action Plan, Action 1 (Digital Economy) particularly addresses the BEPS issues related to the digitalisation of the economy. The other actions relevant to the digital economy include: Actions 3 which aims at strengthening CFC rules, Action 7 which aims to prevent the artificial avoidance of PE status, and Action 8-10 which aim to assure that transfer pricing outcomes are in line with value creation (OECD, 2018a).

3.1. New nexus rules

Regarding the nexus issue, the OECD presented a new taxable nexus based on significant digital presence in the 2014 Interim Report on Action 1. This concept was intended to apply to only digitalized businesses which require minimal physical elements in the market jurisdiction. Significant digital presence could be determined by reference to the number of contracts remotely concluded, the volume of transactions and payments related to digital goods and services, as well as the role of functions performed by an existing branch (OECD, 2014).

However, this option was later retreated because: (1) it would require a substantial departure from the current international taxation principles (2) it is not clear enough

whether such option is warranted at this stage, and (3) it is expected that certain measures in the scope of the BEPS project mitigate BEPS issues while consumption taxes ensure a reasonable taxable base for the market jurisdiction. Nevertheless, the OECD acknowledges that countries are optional to introduce the concept of significant digital presence in their domestic laws as additional safeguards against BEPS concerns, provided that it respects existing treaty obligations in their bilateral tax treaties (OECD, 2015a).

On the other hand, under the scope of Action 7, the OECD makes adjustments to the current PE definition in an attempt to deal with the avoidance of PE status by fragmenting operation activities. There are two important amendments to Article 5 of the OECD Model Tax Convention.

The first amendment relates to the exceptions to the PE definition under Article 5(4) (See Appendix 2). This amendment is relevant to situations where certain local warehousing activities, which used to be considered merely preparatory or auxiliary in nature, may be core business activities of digital businesses such as e-commerce platforms.

Currently, if a non-resident company is viewed to carry on a merely auxiliary or preparatory activity in the market jurisdiction, it is automatically exempt from PE status under Article 5(4). However, such an exception is no longer applicable if the amendment to Article 5(4) is realised (See Appendix 2). More specifically, Article 5(4.1) applies to a non-resident enterprise or its closely related enterprises regardless of whether they have PE status in the market jurisdiction. What matters is whether the combination of activities in the market jurisdiction performed by the related enterprises gives rise to one or more PEs therein. The profits attributable to each PE are those that would have been made by an independent company performing a similar activity. Such profits are then subject to source taxation.

The other amendment under Action 7 relates to the dependent agent PE definition under Article 5(5) and Article 5(6) (see Appendix 3). The objective is to address the artificial use of third-party agents or arrangements related to the remote contract conclusion as described earlier. More specifically, Paragraph 9 of the Report on Action 7 states (OECD 2018b, p.13):

"*As a matter of policy, where the activities that an intermediary exercises in a country are intended to result in the regular conclusion of contracts to be performed by a foreign enterprise, that enterprise should be considered to have a sufficient taxable nexus in that*

country unless the intermediary is performing these activities in the course of an independent business."

While these recommendations under Action 7 show the attempt of the OECD to strengthen the nexus rules in the digital economy, they seem less straightforward than the introduction of digital presence. Plus, the taxing rights of the source country may be protected to some extent but how to allocate profits from such highly integrated activities across the associated entities remains a puzzle.

3.2. New profit allocation rules

Concerning profit allocation, the OECD sticks to the arm's length principle and the current framework of functional analysis to distribute income across associated entities. Determining entitlement to intangible returns is always challenging. The work under Action 8-10 of the BEPS Action Plan attempts to avoid profit allocation only based on the capital provision or the legal ownership of intangibles. Instead, the rights to receive income from intangibles are entitled to members who assume significant risks in the DEMPE of the intangibles.

As the increasing reliance on intangibles in the digital economy, the OECD has revised Transfer Pricing Guidelines on intangibles, in particular giving additional guidance on the transfer profit split method. In the situations where transactions are involved in unique and valuable contributions from multiple parties and/or where the business operation is too highly integrated to evaluate the contribution of each party separately, the OECD suggests that the transfer profit split method is more appropriate than any one-sided method. The transactional profit split method provides great flexibility by accounting for specific and unique facts and circumstances of the involved enterprises. On the other hand, it is complicated to apply, requiring to access information of all associated entities as well as determine combined profits and profit splitting factors.

In 2017, the OECD released the Discuss Draft on Revised Guidance on Profit Split, addressing several key issues including: when it is the most appropriate to use the transactional profit split method, approaches for splitting profits, measures of profits and profit splitting factors.

The OECD provides three situations where the transactional profit split method is the most appropriate: (1) where each party to the transaction makes unique and valuable

contributions, (2) highly integrated transactions, (3) transactions with the shared assumption of economically significant risks between the parties. The transactional profit split method is not, however, automatically selected based on one or more above indicators but rather based on the relative merits and shortcomings of available transfer pricing methods.

There are two approaches to split the combined profits: a contribution analysis and a residual analysis. The former is applied if all related parties make unique and valuable contributions. Under a contribution analysis, the division is based on the relative value of the contributions of each of the parties, using internal information or comparable data. If at least one party makes routine and simple contributions for which there exist comparables, a residual analysis is applied. A residual analysis is similar to a contribution analysis except if the former is used, the combined profits are first reduced by the remuneration for routine functions.

In general terms, the combined profits and the profit splitting factors are determined consistently with the functional analysis over the life-time of the arrangement, reflecting the risk assumption of at least one party. In addition, it is important to ensure that the profit splitting factors are measurable.

The first step to determine the combined profits is to identify the relevant revenues and expenses for each party in relation to the controlled transaction under review. In case of a conglomerate with multiple segments and multiple products, this step is likely to require a detailed financial segmentation. The second step is to make adjustments so that the financial data of all involved enterprises are put on a common basis in terms of accounting practices and currency. The next step is to determine whether actual profits or anticipated profits should be used. The actual profits mean the profits which have been affected by playing out of economically significant risks. Hence, if all parties assume a similar degree of risks, the actual profits would be more appropriate. Alternatively, if one of the parties does not assume any risk, the anticipated profits would be more appropriate. The fourth question relates to operating profits or gross profits. Certainly, operating costs are preferable in the sense that it ensures income and expenses to be attributed on a consistent basis (i.e., operating costs include all costs and then classifying costs is not necessary any more). However, operating profits are used only if the parties share the risks of the entire value chain, including those affecting operating expenses. Otherwise, gross profits are more

appropriate.

Another issue relates to splitting factors and their corresponding weights. The splitting factors can be asset/capital-based (e.g., operating assets, intangibles or capital employed), cost-based factors (such as R&D or marketing spending), and other factors (e.g., incremental sales or headcount). The factors and their corresponding weights should reflect the key value drivers and their relative contributions to the controlled transactions under review.

To facilitate the application of the transactional profit split method, companies are required to provide “the Local File” and “the Master File”. The former should contain a detailed functional analysis of the taxpayer and its associated enterprises. The latter should include information on the important drivers of profitability, the principal contributions to value creation by the entities within the group, and the key intangibles.

By comparison with formulary apportionment, the transactional profit split method is more reliable. The reason is that it determines split factors on a case-by-case basis, accounting for the specific key drivers of transactions while formulary apportionment applies a predetermined formula. Nevertheless, there is a trade-off between such high reliability and considerable complexity.

3.3. Strengthened CFC rules

As mentioned earlier, CFC rules are primarily designed to deter MNEs from shifting income from the parent or other associated entities in high-tax countries into a CFC in a low-tax. Digitalisation makes CFC rules more important. It is because income earned by digitalised businesses is highly mobile and then easily shifted into a low-tax country. Action 3 in the course of BEPS Action Plan provides six building blocks to design comprehensive and effective CFC rules. Generally, CFC rules target at income generated from remote sales or the exploitation of intangibles because a CFC typically contributes hardly any added value to such income.

While the above measures show the attempt of the OECD to combat BEPS practices in the digital economy, it is questionable that such measures will be widely implemented in bilateral treaty relationships and national tax systems. For example, until now, only 17% of tax arrangements apply the revision under Article 5(5) and Article 5(6) and 22% for Article 5(4) (OECD, 2018a).

4. Tax policy developments

While there is no consensus on a multilateral approach yet, many countries have taken uncoordinated and unilateral measures in order to protect their tax base from digital businesses. The common practices include the introduction of nexus rules based on digital presence, withholding taxes on certain types of digital income, and turnover taxes on certain digital transactions (OECD, 2018a). The following explores these measures in detail.

There is a growing concern about the adoption of remote sales which leads to the situation where a non-resident company generates substantial sales without any material presence in a given country. To address this problem, many countries (e.g., Israel, Slovak Republic and India) have proposed to expand the PE definition with non-physical criteria being introduced to capture the "digital presence" (OECD, 2018a). Examples of non-physical factors used include the volume of local sales, the number of online contracts concluded with local customers, the number of local users and the location of web site.[1] Hence, nexus is established in the situation where a non-resident enterprise remotely establishes and maintains ongoing interactions with the users and customers of a given country regardless of the extent of physical presence of that enterprise therein. However, no rules to allocate profits to digital PE are introduced, which would limit the efficiency of this measure. Another constraint comes from the existing double tax treaties.

The second common type of practice relates to withholding taxes on certain types of digital income on the gross basis. Currently, even if a non-resident enterprise is not deemed PE in the source country, this country is allowed to impose withholding taxes on passive income such as dividends, interest, and royalties. Similar to such passive income, income generated from intangibles or remote sales is supposed to be highly mobile. Plus, the distinction between different categories of income has been blurred by digitalisation in some cases.[2] In this context, the Task Force on the Digital Economy (TFDE)[3] suggests imposing withholding taxes on income from certain digital products and services to secure the tax base for the

[1] Note that the thresholds for these criteria are still in discussion in these countries.

[2] For instance, the payment for a cloud computing transaction can be categorised as (1) business profits from providing a service, (2) royalties from rentals of space on the servers or (3) fees from technical services.

[3] the TFDE is a subsidiary body of the OECD Committee on Fiscal Affairs which includes non-OECD and non-G20 country participants.

source country (OECD, 2018a). One of the measures is to broaden the definition of royalties subject to withholding taxes.[1] Another measure is to adopt a withholding tax on fees for technical services (e.g., the payments for the services of managerial, technical, or of a consultancy nature) or on other specific categories of income (e.g., income from online advertising). Similarly to measures related to digital PE, these measures are also limited by the application of existing double tax treaties. In addition, administrative and compliance issues are expected for business-to-customer (B2C) transactions.

The third type of practices is to impose turnover taxes on certain types of digital transactions including online advertising services. Examples include India's Equalisation Levy, Italy's levy on digital transactions, Hungary's advertisement tax and France's tax on online and physical distribution of audio-visual content. Turnover taxes are applicable to both resident and non-resident enterprises. The key is to determine the destination of the supplies. Criteria used to determine this destination vary from country to country. For instance, in France and Hungary, the destination is the location of viewers for the digital content regardless of the location of the payer or the supplier. In contrast, the taxing rights are entitled to the jurisdiction where the payer is located under the scope of turnover taxes in India and Italy. Concerns are raised in terms of tax incidence falling on the customer and of the unequal tax treatment between digital transactions covered and uncovered by turnover taxes. Plus, administrative and compliance issues are expected to arise when it comes to collect tax from foreign-based enterprises.

The OECD warns that these measures, however, are likely to cause some economic distortions, double taxation, increased uncertainty and complexity, associated compliance costs for cross-border businesses, and conflict with some existing bilateral tax treaties in some cases.

[1] That means including certain types of income which were previously classified as business profits into the scope of withholding taxes on royalties. Examples include payments for the use of or the right to software, or payments for "visual images or sounds" transmitted through information and communication technology.

5. The EU's response

5.1. The EU's measures to tackle BEPS practices

Concerning fair and efficient corporate taxation in the EU, the Commission released an Action Plan in June 2015 to reform the corporate tax framework in the EU for purposes of tackling tax abuse, ensuring sustainable tax revenues and supporting a better business environment in the Single Market. The plan identified five key areas for action: (a) Re-launching the Common Consolidated Corporate Tax Base, (b) Ensuring fair taxation where profits are generated, (c) Creating a growingly business-friendly environment, (d) Increasing transparency, and (e) Improving the EU coordination. Among them, the CCCTB is considered as a holistic solution to corporate tax reform (EC, 2015).

The EU has committed itself to support BEPS Action Plan of the OECD/G20 by adopting the Anti-Tax Avoidance Package to prevent aggressive tax planning, enhance tax transparency and generate a level playing field for all businesses in the EU. The EU even goes beyond the OECD/G20's recommendations by introducing additional actions, namely, General anti-abuse rule (GAAR), switch-over clauses and exit taxation in the Anti-Tax Avoidance Directive (ATAD),[1] as well as by introducing its own instruments such as the state aid and the code of conduct.

Additionally, the Commission presented the Tax Transparency Package including measures to boost tax transparency in March 2015. In October 2015, the Council reached a political agreement on the automatic exchange of information regarding cross-border tax rulings (DAC4). In April 2016, the Commission adopted a proposal for a directive which requires both European and non-European large multinational groups to publish a yearly report on their profits and taxes paid in each country where they are active (country-by-country reporting - DAC5). Companies have to disclose how much tax they pay on the businesses outside the EU and in case they do business in a so-called tax haven, companies have to report the related information on a disaggregated basis.

[1] ATAD includes six anti-avoidance measures in total. The other three measures which are also recommended under the BEPS project of the OECD/G20 include: CFC rule, Interest limitation, Hybrid mismatches.

5.2. A Digital Tax Package to tackle BEPS practices in the digital economy

Digital taxation has been put high on the agenda of the EU. The EU's Member States are vulnerable to aggressive tax planning of tech giants. Applying different methods, Tang & Bussink (2017) estimate that Europe could have experienced a deprivation of tax revenues up to €5.4 billion from Google and Apple over the period 2013-2015. In comparison with the other regions, the tech giants enjoyed an unreasonably low effective tax rates in European countries. The tax-to-revenue ratios of Google and Facebook in the EU were out of line with those in the rest of the world. The figures for Google were 9% for sales outside the EU and 0.82% for the sales in the EU. The contrast for Facebook was even sharper with the figure for outside the EU being 34% compared to that of 0.10% for within the EU.

This phenomenon leads to a major fiscal distortion, threatening a level playing field between highly digitalised businesses and brick-and-mortar businesses. According to the EC (2018), the average effective tax rates for digital and traditional companies are 9.5% and 23.2%, respectively. Additionally, digital MNEs have outpaced traditional MNEs with exceptional annual revenue growth of 14% in comparison with a low range between 0.2% and 3% for other multinationals. Lower effective tax rates combined with increasingly large market shares for digitalised businesses have incurred a real risk that tax revenues in many high-taxed jurisdictions will drop deeply in the near future. Hence, it is pressing to have a reform on the current obsolete cross-border taxation system to ensure a fair taxation and a level playing field between traditional and digital businesses, as well as to secure sustainable tax revenues for jurisdictions.

In this context, although supporting the conclusion of the OECD that there should be no special actions to ring-fence the digital economy (Hadzhieva, 2016), the EU has taken bold moves to enhance the adoption of a Digital Tax Package to tackle digital taxation. Unlike the OECD, the EU introduces a new nexus rule related to digital presence and new profit allocation rules to capture the value of data and user participation. The Digital Tax Package includes two solutions. A targeted solution introduces a temporary turnover tax on specified digital businesses. A comprehensive solution aims to set out a new principle for cross-border taxation in the digital economy.

Sections 5.3 and 5.4 discuss the two solutions in depth.

5.3. The targeted solution

Although the OECD and the EU both prefer to reach a consensus-based and multilateral approach to deal with fundamental challenges arising from digitalisation, they have different points of view as to whether interim measures are warranted. The OECD does not recommend any interim measures for the fear of unexpected risks and adverse consequences for investment, welfare, burden on consumers and businesses, compliance and administration costs (OECD, 2018a). Although acknowledging such potential undesirable consequences, the EU has intentions to introduce a targeted solution – that is levying an interim tax on the gross revenues of certain digital income.

This solution strictly follows a range of considerations to avoid unexpected consequences (EC, 2018). First of all, the tax applies to both purely domestic and cross-border transactions (between Member States or between third countries and a Member State), ensuring an equal treatment between domestic and foreign companies, which is compliant with EU treaties and the WTO legal framework. Second, it is temporary and only in effect until a consensus on a comprehensive solution is reached. Plus, it is targeted in the sense that it focuses only on digital activities which the Member States cannot currently tax efficiently. Specifically, the tax targets at services where the main value is created by user data (e.g., search engines or social networks), and services that facilitate interactions between users (e.g., peer-to-peer marketplaces). Small companies and start-ups should not be affected because the tax applies to multinational companies with annual revenues of over €750 million and EU companies with annual revenues between €10 to 20 million. This tax is deductible to mitigate the possibility of double taxation. Last but not least, compliance costs are minimized thanks to the One-Stop-Shop model for the declaration and collection of tax. The EU believes that such a targeted solution is necessary to avoid the adoption of unilateral measures by Member States and to preserve the Single Market.

The literature on two-sided platforms finds that a tax on advertising revenues may be more effective to raise tax revenues in comparison with other taxes. To reflect the value of data and user participation, Colin and Collin (2013) suggest specific taxes on the collection and exploitation of data obtained from users. A tax on data is argued to capture a part of the platform's profits in the sense that the price of data is zero and then the fiscal base is insensitive to such a tax. This conclusion may not always be true, taking into account cross-

group network effects from the interaction between the two sides. As mentioned before in the section 1.3.4 of this part, Bourreau, Caillaud and De Nijs (2018) show that a tax on data collection dissuades the platform from collecting too many data, and thereby reducing the volume of ad-generated transactions and then tax revenues from VAT. The similar effect is expected from the use of a unit tax on advertising. If the VAT rate is large enough, this loss from VAT revenues may outweigh the incremental revenues from a tax on data collection or a unit tax. Nevertheless, Kindt al. (2010) and (2018) show that an *ad valorem* tax on either side leads to increase in sales of both sides, then such a tax generates additional tax revenues without a decrease in VAT proceeds. In other words, an *ad valorem* tax may raise fiscal revenues and welfare, irrespective of the VAT rate.

5.4. The long-term approach with an ultimate integration into the CCCTB

In fact, the EU supports the view that data and user participation play a key role in value creation in the digital economy but the current corporate tax framework is not efficient to capture such a valuable contribution. Hence, the EC proposes to expand the PE definition and introduce new rules for allocating profits from digital activities, ensuring a fair share of tax base to be distributed to jurisdictions of users. In addition to enhancing a fair taxation system between countries, such a reform is expected to create a level playing field for both traditional and digital businesses and preserve sustainable tax revenues to finance public goods which are in turn necessary for the development of the digital economy.

At the EU level, the EC has illustrated its determination to be at the forefront in shaping the global response to digital taxation by introducing a long-term comprehensive solution in the Digital Tax Package in March 2018. The EC plans to realise such a long-term approach through a Standalone Directive addressing digital PE and profit allocation rules which the Member States are then recommended to implement in their double tax treaties. Remarkably, the Standalone Directive is proposed to be ultimately integrated in the CCCTB project later. This Directive applies "*in intra-EU situations between Member States, and situations between Member States and third countries only where there is no applicable double tax treaty*" (EC, 2018). This scope prevents conflicts with rules in double tax treaties, thereby avoiding serious legal uncertainties and political consequences.

Why is a digital PE concept introduced?

The digitalisation of the economy magnifies the issue of circumvention of PE status as mentioned earlier. Highly digitalised businesses tend to establish a subsidiary in a low-taxed country and then transfer the Intellectual Property (IP) rights and perform core functions therein. Thanks to remote sales and automations, they can establish and maintain substantial economic activities in other markets without the need for reallocation.

From a source theory perspective, if data and user participation contribute to value creation, a jurisdiction should be entitled the taxing rights on profits derived from users who base in its territory. The benefit theory also justifies that digital businesses should be taxed in the jurisdiction of users. The reason is that even without physical presence, they still benefit from its public goods such as a stable legal system, the enforcement of payments, the supply of energy or infrastructure.

Accordingly, the EU introduces the concept of digital PE in its Digital Tax Package. A member is granted the taxing rights if one of the following conditions is fulfilled: (1) a company has annual revenues of more than €7 million from digital services in that member, (2) a company has more than 100,000 users accessing to its digital services in that country in a taxable year, or (3) over 3000 business contracts for digital services are created between the company and business users in a taxable year. In short, digital PE establishes nexus based on where users reside and where services are supplied instead of physical presence. This suggests a close alignment between taxation and value creation.

Integration into the CCCTB ensures a fair and effective profit allocation to digital PE

Although some other countries such as Israel, India and Slovak Republic have already introduced the concept of digital PE, they have not suggested any changes in profit allocation rules to clarify how profits are distributed to digital PE. Without solid rules to attribute profits, the introduction of digital PE is *"likely to be viewed as incomplete and largely ineffective at addressing the fundamental issues"* (EC, 2018). Hence, the EC proposes an integration into the CCCTB to allocate profits among Member States. Put generally, under the CCCTB, the tax base of all entities is calculated based on a single set of rules and then profits are consolidated with all intragroup transactions being cancelled out. The consolidated profits are distributed across related entities by a predetermined formula. The factors in the apportionment formula typically include sales, payroll and property. To reflect the contribution of data and user participation, the EU proposes to add the data factor. It

should be noted that the Member States keep their full autonomy over their own tax rate, though.

The second part of the thesis will elaborate on the CCCTB project and more generally the formulary apportionment system.

PART 2: FORMULARY APPORTIONMENT AND DIGITAL TAXATION

1. Separate Accounting and Formulary Apportionment

Globalisation poses challenges to determine the taxing rights on global profits of MNEs across involved countries. Separate accounting and formulary apportion are two different systems to allocate profits of an MNE to its related members. While the former has broadly been recognised as the international standard and supported by the OECD, the latter is popular in federal countries such as the U.S. and Canada. Although it remains polarised among both governments and academics whether formulary apportionment should be a realistic alternative to separate accounting, the EU has taken strong moves to switch from the current separate accounting system to the formulary apportionment system under the CCCTB.

1.1. Disadvantages of Separate Accounting

Under separate accounting, if an MNE has a PE or a subsidiary in a country, this entity has to prepare and calculate its own tax base according to the national tax laws of that country. It means that the MNE has to know and comply with various tax systems in different countries where it does business, and thereby incurring a huge compliance burden.[1]

The arm's length principle is introduced to deal with intra-firm transactions. Without this principle, MNEs had an incentive to manipulate prices of intra-firm transactions so that high revenues are recorded by a low tax entity and high expenses are deducted in a high-tax country.[2]

This principle implies, first, that the associated entities of an MNE are treated on an equal footing as independent companies and second, that the arm's length principle is satisfied generally if there exist comparable uncontrolled transactions. While it is quite simple to find comparables for tangibles and financial lending, it may not be the case for intangibles which are typically unique and hard to value. Additionally, both MNEs and tax authorities bear considerable compliance costs in light of the increasing volume of intrafirm transactions and

[1] To deal with this problem, the EU introduces the Common Corporate Tax Base (CCTB) project in 2016 as a step toward CCCTB.

[2] For example, place an unreasonably high price on the sales from a low-tax entity to a high-tax entity. Accordingly, the profits are taxed at a low rate while corresponding expenses are deductible at the high rate.

the growing document burden. MNEs face the risk of double taxation in case of unilateral transfer pricing adjustment. That is, when a country does not accept the transfer prices proposed by the MNE (i.e., increase the taxable income therein), and the other involved countries do not agree to make corresponding adjustments, the MNE has to pay tax twice for the same profits.

To sum up, separate accounting with the arm's length principle is considered as an impediment to a unified Single Market in the EU. This system would be even weaker in the digital economy which is characterised by heavy dependence on intangibles and highly integrated business models. This justifies the EU's determination to adopt the formulary apportionment system to allocate profits among the associated entities of a multinational group.

1.2. Formulary Apportionment as an alternative

Unlike separate accounting, formulary apportionment treats the associated entities of a group as a single entity. Generally, profits of all entities are consolidated with all intragroup transactions being cancelled out. The consolidated tax base is then distributed across the related entities by a predetermined formula including different factors such as sales, payroll and property.[1] Each involved country keeps its full autonomy over its own tax rate, though. The tax due in each jurisdiction is the product of the share of the tax base and the local tax rate. The general formula to calculate the tax due in each jurisdiction is as follows (Mayer, 2009):

$$P_A = P\left(c_A * \frac{C_A}{C} + l_A * \frac{L_A}{L} + s_A * \frac{S_A}{S}\right)$$

Where:

$P =$ Common tax base of the whole group

$P_A =$ Tax base allocated to country A

$c_A, l_A, s_A =$
weights on capital, labour and sales, respectively. The total of them is equal to 1

$C =$ The total value of tangibles of the whole group

[1] The common tax base can vary from jurisdiction to jurisdiction unless there is a single set of rules to calculate the corporate tax base in all jurisdictions.

$C_A =$ The value of tangibles in country A

$L =$ The total payroll or the number of employees of the whole group

$L_A =$ The payroll or the number of employees in country A

$S =$ The total sales of the whole group

$S_A =$ The sales in country A

Advocates of formulary apportionment point to the elimination of all intrafirm transactions as the decisive factor to switch from separate accounting to formulary apportionment. Consequently, the manipulation of transfer pricing is reasonably expected to be alleviated. Additionally, both MNEs and tax authorities are relieved from the current growing heavy compliance burden since there is no longer need to find comparables and gather related documents to prove transfer prices. Instead, only the total income and the apportionment factors in each location are needed. In most cases, the factors include sales, payroll expenses and assets that are easily observable.

Another argument in favour of formulary apportionment is that this system accounts for the added value from the integration that is ignored under separate accounting. An MNE enjoys synergies from cost savings or extra revenues when operating on an integrated basis. Therefore, it makes no sense to treat the associated members of a group as independent companies.

These above advantages of formulary apportionment make the EU promote the adoption of this system by relaunching the CCCTB project after numerous revelations of tax avoidance scandals.

2. The CCCTB project in a nutshell

The CCCTB project was first introduced in 2011 with a lukewarm reception. In light of new challenges arising from digitalisation, the EU has turned its attention back to the CCCTB as a promising instrument to combat harmful tax practices. The EU tends to integrate the measures proposed under the Digital Tax Package into the CCCTB to distribute profits across the Member States as mentioned earlier. Before going into detail the role of the CCCTB in the Digital Tax Package, it is helpful to introduce the project itself in a nutshell.

In 2016, the EU proposed to relaunch the CCCTB project in a two-step approach, including a proposal for the Common Corporate Tax Base (CCTB) and a proposal for the Common Consolidated Corporate Tax Base (CCCTB). The CCTB aims to mitigate the compliance cost and administrative burden by providing MNEs a single set of rules for calculating the corporate tax base instead of 27 different national tax systems as currently. During the second phase - CCCTB, profits of all associated entities are consolidated and then apportioned according to a predetermined formula among the involved Member States. It is recommended to start considering the consolidation phase immediately after an agreement on the CCTB is reached (Siquier-Delot, 2017).

While the primary objective of the 2011 initiative was to reduce the administrative burden on MNEs, the relaunch in 2016 aims to enhance fair and effective taxation within the Single Market (Siquier-Delot, 2017). The 2016 proposal requires MNEs with sales of at least €750 million to mandatorily apply the CCCTB while keeping it optional for other MNEs.[1]

The CCCTB project can be adopted only with a unanimous consensus of the 27 Member States due to the unanimity requirement in the company tax area. This possibility would hardly be reached taking into account the substantial divergence of opinion among the Member States. However, an agreement via enhanced cooperation should be more realistic.[2]

3. Unitary taxation in the U.S. and the CCCTB

This part aims at comparing formulary apportionment under unitary taxation in the U.S. and under the CCCTB in the EU. Unlike the EU, the U.S. has been implementing formulary apportionment for a long time. Thus, there are substantial experiences the EU can learn from the U.S.'s unitary taxation to construct an efficient formulary apportionment method. Nevertheless, the CCCTB is expected to operate under different principles.

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[1] There are certain concerns about distortions between small and large companies due to this threshold. (Siquier-Delot, 2017).

[2] *"Enhanced cooperation is a procedure where a minimum of nine EU countries are allowed to establish advanced integration or cooperation in an area within EU structures but without the other EU countries being involved. This allows them to move at different speeds and towards different goals than those outside the enhanced cooperation areas. The procedure is designed to overcome paralysis, where a proposal is blocked by an individual country or a small group of countries who do not wish to be part of the initiative. It does not, however, allow for an extension of powers outside those permitted by the EU Treaties"* (EUR-Lex).

By 1930, most of the states in the U.S. had adopted formulary apportionment. The three common factors in the formulae include sales, property and payroll. The states are set free to choose the apportionment formula. Failure to get a common formula across the states leads to over- or under-apportionment. Over-apportionment means the post-apportioned tax base is greater than the pre-apportioned total tax base, implying double taxation for the company. This situation is unlikely to arise at the EU level as a common apportionment formula will be applied.

Another issue of the U.S.'s system arises from significant differences in tax laws across the states to determine the pre-apportionment tax base. Consequently, the common tax base that a company initially calculates for tax purposes at the Federal level may be modified into a different tax base in each state. The EU will avoid this complexity with a single set of rules to calculate tax base under the CCTB.

With regard to the scope of consolidation, it is advisable for the EU to apply the CCCTB only to the income and operation within the EU of an MNE (water's edge consolidation) to avoid international controversy. During the late 20th century, some states in the U.S. such as California applied the worldwide consolidation and caused controversy related to double taxation for certain multinationals. Double taxation may arise from the interaction of formulary apportionment applied in a jurisdiction and separating accounting used in others.

4. Designing the formula

In terms of the sharing mechanism, in the 2017 draft of European Parliament legislative resolution on the proposal for a Council directive on a CCCTB, the EU proposed a new formula including the data factor besides the three classic factors (i.e., sales, labour and property). Note that the data factor is included in the formula for the first time under the CCCTB. The new proposed formula is as follows:

$$Share\ A = \frac{1}{4}\frac{Sales^{A}}{Sales^{Group}} + \frac{1}{4}\left(\frac{1}{2}\frac{Payroll^{A}}{Payroll^{Group}} + \frac{1}{2}\frac{No\ of\ employees^{A}}{No\ of\ employees^{Group}}\right) + \frac{1}{4}\frac{Assets^{A}}{Assets^{Group}} + \frac{1}{4}\left(\frac{1}{2}\frac{Data\ collected^{A}}{Data\ collected^{Group}} + \frac{1}{2}\frac{Data\ exploited^{A}}{Data\ exploited^{Group}}\right)$$

This section examines how this formula would better reflect the new economic reality in the digital economy. To this end, it is useful to start with an analysis of how data and user participation contribute to value creation in the digital age.

4.1. Data and value creation in the digital economy

Despite the general acknowledgement that users have increasingly involved in many digital businesses, it remains controversial as to whether and to extent the participation and provision of data contribute to value creation in the digital economy among countries (OECD, 2018a).

A common understanding of value creation is a prerequisite to ensure taxes to be paid close to the location of value creation. OECD (2018a) analyses the value creation in the digital age by three different approaches, namely value chain,[1] value network[2] and value shop.[3] While such analyses shed light on how various digital business models generate value, they cannot close the debate about the role of user contribution in value creation. Different opinions on this matter lead to different approaches to tackle digital taxation. If user contribution is perceived as a source of value creation, there is a need to reform the existing international tax framework in terms of nexus rules and profit allocation rules.

OECD (2018a) highlights two main opinions on the role of data and user participation to value creation. The first point of view is that user contribution should be viewed as material, besides algorithms and other intangible assets. The other opinion, however, considers data and user participation as any other input from an independent, third party rather than an activity to which profit should be attributed.

It is particularly evident that data and user participation are ever more important to many digital business models. First, in two-sided markets where users generate positive network

[1] Developed by Michael Porter (1985), the value chain is a standard tool to analyse a firm's competitive advantage. There are two strategies to create superior value: low-cost or differentiation. The value chain is largely applied in case of manufacturing domestic businesses.

[2] The value network describes businesses in which the key is to link users, suppliers and customers together through the mediating technology. Unlike a linear production process in the value chain, activities are performed concurrently in the value network (OECD, 2018a).

[3] The value shop portrays businesses in which a combination of hardware, software and expertise creates values by resolving customer problems or demand. Unlike the value network, service providers in the value shop do not play an intermediary role (OECD, 2018a).

effects through interactions with each other or with the other side, a large community of active and engaged users is a key value driver. For example, the size of viewer group is a key to attracting advertising clients in case of an advertising-financed platform. Thus, it is of certain importance for two-sided platforms to attract a maximal number of users by constantly enhancing the user experience.

Second, data and user participation bring digital businesses enormous advantages over traditional businesses. Take advertising-financed media as an example. Marketers prefer digital media (e.g., search engines or social networks) to traditional media (e.g., newspaper or TV) because they enjoy two-way conversations,[1] detailed customer insights, a targeted reach and personalised ads. All of these advantages are likely to increase the conversion rate, i.e., the rate at which a customer who browses the site is converted to a paying customer. Additionally, online marketing allows advertisers to proactively brand through their own generating contents. Also, they are provided useful tools to track and measure their marketing campaigns. With such benefits, it is understandable why there is an increase of 13% in digital marketing spending in 2017 compared to a 2% cut in budget for traditional marketing according to the 2017 CMO survey.

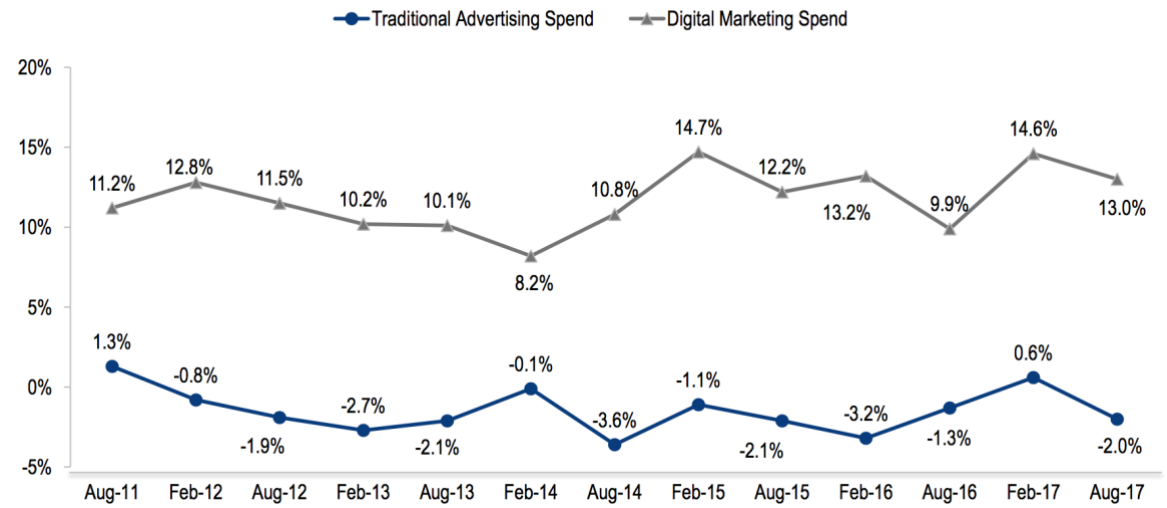

Figure 8:
Percent change in traditional advertising and digital marketing spending (2011-2017)
Source: The CMO Survey (2017, p.25)

[1] Unlike traditional marketing, online marketing not only delivers messages of advertisers to their audience but also allows customers to join, express their interest and leave feedback which give valuable insights for the advertisers.

Another advantage is that the collection of massive data provides a digital platform with insights to constantly enhance the user experience and make the user community more engaged, which in turn leads to a higher volume of transactions from the commercial side. Traditional media has little information about the interest of their viewers while a social network tracks and analyses every activity of its users. Plus, a digital platform is in a better position to alleviate negative externalities by delivering relevant ads and giving choices to skip ads. It is important because while positive networks make the market sides stickier to the platform, negative effects keep them stay away.

Third, there has been a boom in data monetisation in both digital and traditional businesses. Data monetisation can be loosely defined as the generation of measurable economic benefits from available data sources (McKinsey, 2017). McKinsey survey (2017) finds that across industries from high tech to basic materials and energy, data monetisation is considered as the key to creating differentiation in ever more competitive landscape. Data analytics, a process to proceed data to guide business decisions, has brought about far-reaching and profound changes to many business functions, including sales, marketing and R&D. Most respondents of the survey agree that data analytics is primarily employed to add new services, improve existing offerings, develop new business models, and even directly sell data-based products or utilities. Data monetisation is believed to contribute more than 20 per cent to revenues of industry-leading performers. Likewise, PwC The Strategy& (2013) has estimated that, in the financial sector alone, commercializing data will bring in a revenue of $300 billion per year by 2018 thanks to a broader customer base and a new generation of high margin products and services developed from powerful insights obtained from both internal and external data.

The analysis so far shows that digitalised businesses clearly benefit from user contribution to some extent. In most cases, they, in turn, provide users with financial or non-financial compensation (e.g., free access to certain web-based services). From this perspective, it is argued that data should be viewed as a barter transaction between users and digitalised platforms, similarly to any other input from an independent third party (OECD, 2018a). This opinion, however, should be questionable for two reasons: (1) providing users with free access would maximize profitability for the platform, and (2) free access should not be

automatically regarded as equal to the privacy costs and nuisance costs that users would bear when accessing the platform.

First, as mentioned earlier in the section 1.3.3 of Part 1, it is typical for a monopoly two-sided platform to subsidise (i.e., charge under the marginal costs) the side which exerts stronger positive externalities on the other side to get both sides on board (Belleflamme and Peitz, 2015). Plus, when platforms have to compete for customers who are single-homing, platforms tend to subsidize them to have a sufficient number of them on board, generating a larger volume of transactions and higher profits from customers who are multi-homing (Caillaud and Jullien, 2003 and Belleflamme and Peitz, 2015). In the digital media, viewers tend to be single-homing, generating positive cross-side effects on advertisers. In contrast, advertisers multihoming to maximize the matching probability may be a nuisance for ad-hating viewers. As a result, the platform has an incentive to provide viewers with free access. Similarly to free newspapers and TV programmes given by the traditional media, free access to an advertising-financed platform should be considered as a profit-maximizing strategy to have a large and engaged audience to charge a higher mark-up to advertisers rather than an exchange for data provision.

Second, users incur privacy costs and nuisance costs from the display of ads when accessing platforms. Users have to pay premium to eliminate nuisance; there is no longer the display of ads for premium accounts. Premium users, however, keep incurring privacy costs as platforms continue collecting their personal data.

Studies show that the access price generally reflects privacy costs of the subsidised side in two-sided platforms. Free access implies high privacy costs. Casadesus-Masanell and Hervas-Drane (2015) find that low privacy firms tend to subsidize while high privacy firms charge positive prices. In the application market, companies have an incentive to lower the price of an application which allows them to collect more personal data (Kummer and Schulte, 2016). The question is whether free access or a lower price adequately compensates for such privacy costs. The absence of a market for personal information implies that under no circumstance are users paid for their provision of data. Also, Laudon (1996) shows that such market failure partly leads to privacy invasion, that is personal data is obtained and used without consent of the individual. Individuals provide information for the sake of a legitimate transaction but such information is then gathered, causing individuals to lose

control over their own information. Other studies by Bonneau and Preibusch (2010) and Dimakopoulos and Sudaric (2018) find that privacy costs increase in the market power of digital platforms; the weaker the competition is, the larger extent of data platforms tend to extract. This finding is important taking into account the tendency toward monopoly or oligopoly in two-sided markets.

Not only do users provide personal data but they also provide digital platforms with a large pool of engaging pervasive contents for no charge. This brings digital media an enormous advantage compared to traditional media who typically have to incur huge costs to produce their own contents. While enjoying both direct and indirect network effects from an additional user, a digital platform is likely to bear negligible marginal costs. Hence, in order to fully reflect the trade-off between the interaction between users and the platform, there should not be a restriction on the price setting of platforms; it makes good sense if users are even paid when joining a platform.

Another argument against the contribution of data to value creation is that raw data would not create any values until they are processed and analysed by sophisticated algorithms (OECD, 2018a). In other words, data collection is viewed as auxiliary and preparation. This argument should be questioned in the sense that data collection constitutes a complementary function of a cohesive business operation. For instance, only with data collected from billions of active users can Google deploy its sophisticated algorithm to create highly relevant ads for advertisers to approach targeted customers.

Instead, it would make more sense to consider data as self-developed intangibles (OECD, 2018a). An argument in favour of this view is that a large and engaged user base could erect an entry barrier, allowing existing digital platforms to secure the dominant position for a long time. It is unlikely for any new player to replace Google or Facebook in the same way as these two tech giants supplanted and surpassed Yahoo or Myspace at the early years of digital media. As can be seen from Appendix 4, Google has dominated the market, representing around 90 per cent of Search Engine Market Share Worldwide since 2009 (Statcounter, 2018).

To sum up, data collection should not be viewed as an auxiliary activity. Rather, it should be regarded as a core activity generating profits for MNEs. Accordingly, the market jurisdiction

where active users reside and data originally derive from should be granted the taxing rights even when the multinational company does not have physical presence therein.

The different points of view on the role of data and user participation lead to divergent approaches to deal with digital taxation between the OECD and the EU.

4.2. A four-factor formula

In the countries where formulary apportionment is used, there is a large variation in the formula in terms of factors and their weights. For example, Germany uses a formula only with the payroll factor; Canada's formula contains equal weights on the payroll and sales factors. In the U.S., the formulae vary from state to state with some applying the only-sale factor formula. The EU also designs its own formula taking into account wider divergences between the Member States.

Weiner (2006) provides the guiding principles to design an apportionment formula including: (1) being politically acceptable in the sense that it seems to ensure a fair balance of the tax burden for different economic actors, (2) distributing income across jurisdictions based on where income is generated (3) mitigating the investment distortions due to the manipulation of location of highly-mobile factors (4) preferably including multiple factors to ensure a more stable income distribution and (5) including easily measurable factors. It is worth noting that no single formula can satisfy all these desirable qualifications and that it is generally not possible to design a formula which is both efficient and equitable simultaneously.

In general terms, a formula is designed in a manner to effectively reflect the economic reality (Weiner, 2006). In other words, it should include primary value drivers of the economy. Accordingly, the capital and labour factors should be included in the formula. They are income-generating factors and then profits should be distributed to the associated entities in proportion to the level of capital and labour exploited. While most of the current practices in the other countries related to the property factor are adopted by the EU, the labour factor is proposed to comprise both payroll and the number of employees with equal weights. This represents the compromise and balances the interest among the Member States, taking into account a wide range of wages in the EU.

Not only do such origin-based production factors create value but also the demand does (Musgrave, 1984). Shay, Fleming, and Peroni (2002) assert that a country that provides a market has a legitimate claim to tax the income from sales and services in this country. Thus, the formula should include a destination-sales factor as a demand factor to balance the interest of manufacturing and market jurisdictions.

If the role of data and user participation in value creation in the digital economy is acknowledged, the classic formula with three factors, namely the sales, property and labour factors may fail to reflect the contribution of users. Thereby, the EU proposes to include the data factor in its formula under the CCCTB to reflect user contribution when it comes to split profits among the Member States.

Another objective of an efficient formula is to deter MNEs from distorting investment decisions by manipulating the location of factors (Weiner, 2006). Under formulary apportionment, the effective tax rate varies with the distribution of factors. For example, if the capital factor is included in the formula, additional capitals in a location result in an increase in the share of income apportioned to that location. All else equal, the effective tax rate of the group increases (decreases) if the tax rate in that location is higher (lower) than the current effective tax rate. Under a uniform formula system like the CCCTB, a wide divergence of tax rate across the Member States motivates MNEs to manipulate by locating capitals and labour in a low-tax country. In the digital economy, the adoption of remote sales and the centralisation of activities make such a manipulation easier than ever.

As the property and labour factors are growingly susceptible to manipulation, the role of immobile factors such as the sales factor is critically important to secure a fair share of tax base for high-tax jurisdictions. In the U.S., while Massachusetts formula with equal weights on three factors was largely used in the 1950s, most states have moved toward formulae that increase the weight on the sale factor since the early 1980s. For tax year 2018, 28 states employ a sales-only formula, 11 states implement a double-weighted sales formula,[1] 2 states use a triple-weighted sales formula[2] and only 7 states keep the Massachusetts formula (See Appendix 5). An increase in the weight on the sales factor implies lower weights on the

[1] $Share\ A = \frac{1}{2}\frac{Sales^{A}}{Sales^{Group}} + \frac{1}{4}\frac{Payroll^{A}}{Payroll^{Group}} + \frac{1}{4}\frac{Property^{A}}{Property^{Group}}$

[2] $Share\ A = \frac{3}{5}\frac{Sales^{A}}{Sales^{Group}} + \frac{1}{5}\frac{Payroll^{A}}{Payroll^{Group}} + \frac{1}{5}\frac{Property^{A}}{Property^{Group}}$

production factors. Hence, the states prefer a more-weighted sales formula to attract additional investment spending (Weiner, 1994) or manufacturing employment (Goolsbee and Maydew, 2000).

Many studies show that the use of a sales formula also mitigates tax competition. The studies by Gérard (2006, 2007) and Riedl and Runkel (2007) find that if the formula puts emphasis on the sales factor, MNEs are unlikely to have any incentive to move to a low-tax country. This is because more weight on the sales factor means lower weights on the production factors, and thereby the relocation of investment leads to a slighter reduction in tax liabilities. Simultaneously, relocation incurs additional costs and if these costs exceed the tax savings, MNEs no longer want to relocate. Consequently, jurisdictions may not find tempted any more to enter in a race-to-the-bottom as the investment decision is less insensitive to the tax rate. Using a different model, Pethig and Wagener (2007) also reach the similar conclusion that equilibrium tax rates are typically the lowest when apportionment is based on property-shares, followed by payroll-shares and sales-shares apportionment. Eichner and Runkel (2008) conclude that formulary apportionment with the sales factor may mitigate or even eliminate fiscal externalities caused by countries' tax policy.

There are two important issues related to the sales factor: the nexus requirement and the location of sales. First, sales are only assigned to a country where the MNE has a nexus. This requirement would create an incentive for the MNE to give up the physical presence by employing independent third parties in high-tax countries. The digital economy exacerbates this issue because digital businesses can reach customers globally with little or no physical presence. This implies that a definition of digital PE is the key to enhancing the taxing rights of the destination country and to preventing new tax planning opportunities under formulary apportionment.

Second, the rule to assign sales either on a destination basis or on an origin basis is more important in the digital economy. The destination means the location of consumption while the origin means the location of income-producing activities or the location of sales negotiation. The destination basis is typically used for physical products and the application is quite straightforward with receipts being assigned to the countries where goods are shipped or delivered. On the other hand, for service or digital goods, sales may be assigned

on an origin basis, based on where the income-producing activities occur by reference to the proportional time or costs of performance (Weiner, 2006). However, it is not always clear to measure such indicators, particularly in the digitalized economy where the value chain is more integrated than ever. As illustrated with the business model of Google, the core business activities such as the development and maintenance of websites or networks can be remotely carried out by staff of many associated entities throughout the day regardless of the location of servers. If the sales are assigned to the location of contract conclusion (also where intangibles and their legal ownership are held), MNEs will have an incentive to manipulate by transferring intangibles to a low-tax country. Consequently, the taxing rights of jurisdictions of users are not secured.

Instead, under the CCCTB, the EU proposes a destination basis to assign sales for services and digital goods across countries. That is sales from supplies of services are located based on where the services are physically carried out or supplied (the same rule as how to locate the sales of services for EU VAT purposes). In two-sided markets, services can be delivered with the involvement of customers from both sides who can be in different countries. Hence, it is of importance to clarify how the destination is determined. Say, the destination should be clearly defined either the jurisdiction of advertisers (payers) or the jurisdiction of viewers (where ads are ultimately displayed) in case of advertising-financed media. In order to balance the interest of both jurisdictions, it is advisable to locate the sales factor according to the location of advertisers and simultaneously include the data factor to secure the taxing rights for the jurisdiction of users. Plus, similarly to the sales factor, the data factor is immobile because the location of users is fixed and almost impossible to manipulate.

Under separate accounting, the adoption of remote sales and the centralisation of activities in the digital economy have eroded the tax base of high-tax countries with a large pool of users. The common tax strategy of digital businesses is to transfer intangibles, centralise all core activities and conclude contracts in a low-tax country so that most of their revenues are taxed in that country. The contribution of data is entirely ignored; there is no certainty that the taxing rights are entitled to either the jurisdiction of users or the jurisdiction of advertisers. If the sales and data factors are included in the formula, part of the common tax

base will be secured for both jurisdictions rather than entirely attributed to the low-tax country.

The exclusion of intangibles from the formula has provoked criticism on formulary apportionment. Intangibles are excluded chiefly because they are so highly mobile that they are susceptible to manipulation. Also, it is difficult to determine their market value. In light of growingly heavy reliance on intangibles, the exclusion of intangibles may not reflect the reality of the digital economy (Röder, 2012). Under the CCCTB, intangibles remain out of the formula. However, the inclusion of the data factor in the new formula may partly address this problem. As mentioned earlier, data can be viewed as an intangible asset of digital businesses. It makes good sense to argue that the exploitation of intangibles is proportionate to the number and/or the engagement of users. While other intangibles are mobile, it is possible to track the location from which data is derived.

4.3. New issues under formulary apportionment

The above analysis does not necessarily imply that formulary apportionment is a flawless system. The common consolidated tax base means that any profits or losses on intra-group transactions between members of the consolidated group will be eliminated.[1] Nor would it include intra-group provisions. Hence, formulary apportionment is considered as a panacea for the manipulation of transfer pricing or for the use of passive holding companies to avoid tax. Nevertheless, this system itself arises new issues.

The first issue concerns the ability to reach a consensus on apportionment formula because choices of factors and their relative weights may affect the Member States in different ways (Weiner, 2006). For example, the data factor is likely to be favoured by high-tax jurisdictions with the high number of users while higher weights on the property and labour factors are welcomed by low-tax countries with a smaller user base.

The second potential problem relates to the scope of the application of the formulary apportionment or the so-called water's edge issue. That is, if the consolidation scope is limited to a specified border such as within the EU under the CCCTB instead of a worldwide consolidation, the participating countries will face the same risk of transfer pricing and

[1] This would include any profits or losses on the disposal of stocks, fixed assets, shares in consolidated companies or other tangible or intangible assets.

improper profit shifting in presence of third countries. This is because separate accounting and the arm's length rules continue to be applied for controlled transactions related to associated entities in third countries. For instance, MNEs may continue using passive investment companies for its aggressive tax planning as under separate accounting. An out-of-state passive holding company is established in a tax-favourable jurisdiction to hold intangibles or function as a capital provider for the other associated entities in high-tax locations. Accordingly, royalties or interest will be recorded by this passive holding company to enjoy a low tax rate while the other entities take advantage of deductible expenses at a higher tax rate. To tackle such tax avoidance, Weiner (2006) suggests that the Member States may deny deductions for certain expenses related to transactions with an enterprise resident outside the EU if the residence country offers a preferential regime. Alternatively, the EU may increase the withholding tax rate on certain payments made to a low-tax country outside the EU.

In addition, the water's edge consolidation is likely to increase compliance costs because tax authorities and MNEs would still need experts on the arm's length principle. Plus, in case of a dispute between countries on the profits attributable to their countries, it would be harder to reach a consensus to make adjustments when they follow different allocation systems (Weiner, 2006).

The third issue is that new forms of income shifting can arise under formulary apportionment due to the variance in terms of financial practices, factor definitions and group definitions. For example, as the definition of employees has not been harmonised under the CCCTB direction, divergent interpretations of this factor can lead to harmful practices among the Member States (Siquier-Delot, 2017).

Even with a consensus on the formula as well as definitions on the factors, as long as tax rates differ across the Member States, MNEs have an incentive to relocate its factors for tax minimization reasons, leading to investment distortions. Weiner (2006) illustrates how an MNE can manipulate the location of factors to reduce its tax liabilities. For example, firms may relocate where sales take place by altering the location where goods are delivered or where the title is transferred. Regarding the property factor, it is harder to alter the location of fixed property and equipment but there is still room for relocating warehouses or distribution centres to a tax-favoured location. Concerning the labour factor, the MNE can

reduce the payroll in a high-tax jurisdiction by locating the management in a low-tax location, hiring independent contractors or employing different types of compensation (e.g., fringe benefits, stock grants, …) instead of wages.

Last but not least, formulary apportionment assumes no difference in productivity and rate of return across the Member States (Weiner, 2006). However, there are situations where an individual entity within the MNE is profitable while the MNE as a whole is suffering from losses. In such situations, formulary apportionment may attribute income to locations where it was not earned.

5. Tax incidence and tax competition

5.1. Tax incidence

Tax incidence is the distribution of the overall tax burden between sellers and buyers in an economy. In other words, it analyses who, the buyer or the seller, is paying more of the overall taxes in the economy by evaluating the price elasticity of demand and supply. If the demand is more elastic than the economic supply, the tax burden will fall on the supplier and vice versa.

McLure (1981) concludes using formulary apportionment effectively transforms the corporate tax into a composite of taxes levied on whatever factors are employed in the apportionment formula. Hence if the data factor is included in the formula, it implies that a tax is imposing on data. This can be clarified by arranging the group's tax liability in a Member State as follows:[1]

$$T_A = Sales_A * \frac{1}{4} * t_A * \frac{Profit_{Group}}{Sales_{Group}} + Labour_A * \frac{1}{4} * t_A * \frac{Profit_{Group}}{Labour_{Group}}$$

$$+Assets_A * t_A * \frac{1}{4} * \frac{Profit_{Group}}{Assets_{Group}} + Data_A * \frac{1}{4} * t_A * \frac{Profit_{Group}}{Data_{Group}}$$

As can be seen from this formula, data derived from a Member State are levied at a tax rate equivalent to $\frac{1}{4} * t_A * \frac{Profit_{Group}}{Data_{Group}}$, the product of the weight on the data factor, the tax rate therein, and the firm's profit margin on the total data.

[1] For the sake of simplicity, labour factor here represents for both the number of employees and payroll. Similarly, there is no distinction between data collected and data exploited as in the proposed formula by the EU.

Also, McLure (1981, p.402) examines the incidence of corporate income tax under formulary apportionment with a three-factor formula and finds that:

"*To the extent that either labour or property is mobile between states, the tax would tend to be borne by economic activity that is specific to the state, such as immobile capital, immobile labour, land, and consumers of locally produced goods and services*."

This conclusion should hold in the presence of data factor in the formula. In light of the two-sidedness of many digital businesses, it is interesting to explore which side of the market is likely to ultimately bear the tax burden related to the data-related portion of tax base. To my best of my knowledge, the tax incidence of a data tax is not studied. However, the literature on two-sided markets could give the first clue to examine this aspect. If a platform decides to pass the tax burden on users, it will charge fees for access or data uploading. This lowers the level of data and user participation which are decisive factors to get the other side on board as mentioned earlier. Accordingly, the platform loses customers on the other side from whom it earns most revenues. The positive cross-group externalities that users exert on the other side may dissuade the platform from passing the tax burden to users. Instead, the tax incidence would fall on the other side who generally benefits from the positive cross-group externalities.[1]

5.2. Tax competition

Gérard (2007) distinguishes between virtual and real tax competition among countries in the conventional economy. The former relates to competition to attract the tax base, including "paper profits" while the latter aims to attract real investments.

Typically, the MNE tends to set up a passive holding company in a low-tax country and then manipulate transfer pricing and/or use a lucrative detour to earn "paper profits". Accordingly, profits are shifting to that low-tax passive jurisdiction while expenses are deducted at higher rates in active jurisdictions. The existence of such a holding company functioning as a financial hub[2] in a low-tax country changes significantly the geographic

[1] The tax incidence of a data tax is another aspect worth investigating. However, it is out of the scope of this thesis. I am attempting to give the general view on this matter using the literature on two-sided markets.

[2] Typically, a holding company with few employees and a hotel office will be set up in this passive jurisdiction. Consequently, private consumption does not increase therein.

distribution of private and public components of the social welfare between the involved countries. Active jurisdictions hosting the real production are deprived of part of their tax revenues but not at all of their private consumption.

Active jurisdictions where economic activities take place compete for real investments in their countries. Tax payers have to relocate to enjoy lower taxation, incurring costs arising from fixed investments in factory, the quality and costs of labour and the access to infrastructure. In other words, MNEs face a potential trade-off between tax liability reduction and relocation costs.

Tax competition in the digital economy may look quite different on account of heavy reliance on intangibles and the centralisation of operating activities. Unlike conventional companies, there may be no need for digital businesses to employ a lucrative detour or the manipulation of transfer pricing to avoid taxes in local markets once the transfer of intangibles takes place.[1] The key point is to take advantage of current profit allocation rules based on the legal ownership to record all revenues in a low tax country. As illustrated in the Google case, all advertising revenues are treated as revenues of Google Ireland Limited resident in Ireland. Income from intangibles is entitled to Google Ireland Limited and is subject to tax in Ireland as this subsidiary holds the legal ownership of intangibles and the authority to conclude contracts. There are neither royalties nor intermodal finance between Google Ireland Limited and local subsidiaries in Google's tax strategy.

Another difference is that digital businesses often incur low costs to move across countries because of a low requirement for fixed investments (e.g., factory, equipment, etc.). Additionally, a high degree of centralisation of activities suggests that a digital business tends to recruit most employees where intangibles are held, thereby increasing private consumption therein. For example, as of November 2016, Google has employed nearly 3100 people in Ireland, equivalent to 40% of its total employees in Europe while the number of users in Ireland represents 1% of users in the EU (See Appendix 6 and Appendix 7). As a consequence, countries where active users and advertisers reside may be deprived of both tax base and private consumption in the digitalised economy. In some cases, countries have

[1] The manipulation of transfer pricing may take place when determining the value of intangibles at the transfer time. Hard-to-value intangibles are typically transferred at a low price on account of the absence of a track record of their performance at the time of transfer.

an incentive to lower their tax rates mainly to obtain real investments rather than paper profits as in the traditional economy. As can be learned from the Google case, the "Double Irish Dutch Sandwich" scheme does not necessarily lead to a larger corporate tax base for Ireland (most profits are taxed in Bermuda at a rate of zero). However, Ireland primarily benefits from higher personal income tax revenues. While the corporate tax rate is among the lowest in the world (12.5%), labour is highly taxed in Ireland.[1] Therefore, it is reasonable to expect much more intense tax competition of the race-to-the-bottom type in the digital world.

Under separate accounting, such an arrangement leads to a phenomenon of "all or nothing". That is a tax-favoured Member State obtains real investments and most of the tax base while other high-tax Member States gain almost nothing compared to the benefits that digital businesses derive from the local user base and data. The formulary apportionment system with a formula including the data factor would ensure a certain part of profits to be allocated to high-tax jurisdictions where active users base.

From the above analysis, intuitively, under the new proposed formula with the presence of data factor, a country with lower demands from both market sides (i.e., users and advertisers) would be reasonably expected to enter the race-to-the-bottom because its share of the common tax base will almost depend on its proportions of property and labour. By contrast, high-tax countries with the high numbers of users and advertisers have no longer motivation to reduce their tax rates. Instead, they are probably tempted to increase their own tax rates. To examine how a platform may respond to a tax increase, I modify the model of Kolmar and Wagener (2007) to a new reality in the digital economy.

The setting is as follows: There are three countries in the game, named A, B and C, who reach a consensus to apply formulary apportionment to split consolidated profits. A monopoly two-sided media platform operates in all three countries. It is assumed that the countries aim to maximize their tax revenues while the platform aims to maximise its profits. An equally weighted four-factor formula is used and the share of tax base for each country is given by

$$\Phi_i = \left(\frac{1}{4} * \frac{K_i}{K} + \frac{1}{4} * \frac{L_i}{L} + \frac{1}{4} * \frac{S_i}{S} + \frac{1}{4} * \frac{D_i}{D}\right) . \Phi$$

[1] The top marginal rate of tax including Universal Social Charge and PRSI-Social Insurance is 52%

Where:

$\mathrm{i} = \mathrm{A}, \mathrm{B}, \mathrm{C}$

$\Phi =$ Common tax base of the whole group

$\Phi_i =$ Tax base allocated to country i

$K =$ The total value of tangibles of the whole group

$K_i =$ The value of tangibles in country i

$L =$ The total payroll or the number of employees of the whole group

$L_i =$ The payroll or the number of employees in country i

$S =$ The total sales of the whole group

$S_i =$ The sales in country i

$D =$ The total data of the whole group

$D_i =$ The data in country i

Country A has no users and advertisers (i.e., $S_A = 0, D_A = 0$) and then its share of consolidated tax base depends on its proportions of capital and labour. As a result, country A tends to set the lowest tax rate to induce the platform to invest in A. For the sake of simplicity, suppose that the platform can maintain its economic activities everywhere from a particular location. Also, assume that the return on investment and the productivity are the same in the three countries. The platform then prefers to locate all capitals and labour in A (i.e., $K_A = K, L_A = L$) to optimize its taxation.

Applying the apportionment formula, the share of consolidated tax base allocated to A is equal to:

$$\Phi_A = \frac{1}{2}.\Phi$$

The other half of consolidated tax base is split between B and C where users and advertisers reside. Unlike A, their shares of consolidated tax base depend on the volume of advertising sales and their user base.

The platform gives free access to users to build audience with a view to attracting advertisers from whom most of its revenues derive. The platform decides how much data

D_i to collect in each country $i = B, C$, bearing in mind the dependence of advertising sales on the volume of data collected. The international trade exists among the two countries. Therefore, advertisers in any country tend to place ads not only in their own country but also in the neighbouring country. Sales of advertising in a country, labelled S_i with $i = B, C$ then depend on the volume of data collected in both countries: $S_i(D_B, D_C)$. Note that $S_A = 0$ because there are no advertisers in country A.

Label the costs of the platform as $C(D_B, D_C)$ which depends on the volume of data collected and comprises two parts: fixed costs C_0 and variable costs $\tilde{C}(D_B, D_C)$ where $\tilde{C}(0,0) = 0$:

$$C(D_B, D_C) = C_0 + \tilde{C}(D_B, D_C)$$

The pre-tax profits of the platform are given as:

$$\pi_g(D_B, D_C) = S_B(D_B, D_C) + S_C(D_B, D_C) - C(D_B, D_C)$$

The consolidated tax base of the platform is:

$$\Phi(D_B, D_C) = S_B(D_B, D_C) + S_C(D_B, D_C) - \gamma C(D_B, D_C)$$

where $\gamma \geq 0$ measures the degree of tax-deductibility of costs.[1]

Denote $\beta(D_B, D_C)$ as the fraction of the consolidated tax base assigned to country B. Applying the apportionment formula, $\beta(D_B, D_C)$ is computed as:

$$\beta = \frac{1}{4}.\frac{D_B}{D_B + D_C} + \frac{1}{4}.\frac{S_B}{S_B + S_C} \quad (1)^2$$

As a half of the tax base is already assigned to country A, β has to satisfy the following condition:

$$\beta(D_B, D_C) \leq \frac{1}{2}$$

Accordingly, the fraction of the consolidated tax base assigned to C is: $\frac{1}{2} - \beta(D_B, D_C)$.

The tax rates in A, B, C respectively are t_A, t_B and t_C. The tax revenues of each country are given by:

[1] Under CCTB with a single set of rules to calculate the tax base, γ is the same in every country.

[2] Note that $S_A = 0$, $D_A = 0$, $K_B = K_C = 0$ and $L_B = L_C = 0$

$$T_A = t_A.\frac{1}{2}.\Phi$$

$$T_B = t_B.\beta.\Phi$$

$$T_C = t_C.(\frac{1}{2} - \beta).\Phi$$

The after-tax profits of the platform amount to:

$$\pi_n(D_B, D_C) = \pi_g(D_B, D_C) - (T_A + T_B + T_C)$$
$$= \pi_g(D_B, D_C) - \left[\frac{1}{2}.t_A + t_B.\beta + t_C.\left(\frac{1}{2} - \beta\right)\right].\Phi$$

The platform's objective is to maximize its after-tax profits by collecting a right amount of data:

$$\frac{\partial \pi_n}{\partial D_i} = \frac{\partial \pi_g}{\partial D_i} - \left[\frac{1}{2}.t_A + t_B.\beta + t_C.\left(\frac{1}{2} - \beta\right)\right].\frac{\partial \Phi}{\partial D_i} - (t_B - t_C).\frac{\partial \beta}{\partial D_i}.\Phi = 0 \text{ where } i = B, C \quad (2)$$

A tax increase in either B or C causes the platform to consider adjusting the levels of data collected in each country. If it keeps the levels of data constant, all else equal, the fraction of tax base assigned to each country remains the same. Then, the overall tax liability of the platform increases as the tax bill goes up in the country where the tax increase occurs. The platform then wants to adjust the volume of data collected in both countries. Adjusting the data level leads to not only a change in the relative fractions of tax base among the countries but also a change in total profits of the platform. To simplify the analysis, assume that B and C are symmetric countries and impose the same tax rate initially:

$$t_B = t_C = t$$

Implicitly differentiating (2)[1] yields the following effects of a change in t_B on data collection:

$$\frac{\partial D_i}{\partial t_B} = \frac{\beta.\frac{\partial \Phi}{\partial D_i} + t.\frac{\partial \beta}{\partial D_i}.\Phi}{\frac{\partial^2 \pi_g}{\partial^2 D_i} - \frac{1}{2}.(t_A + t).\frac{\partial^2 \Phi}{\partial^2 D_i}} \quad (3)$$

The expression in the denominator of equation (3) is negative from the second-order conditions. In contrast, the sign of the numerator of equation (3) can be either negative or

[1] $\frac{\partial(\frac{\partial \pi_n}{\partial D_i})}{\partial t_B} = \frac{\partial^2 \pi_g}{\partial^2 D_i}.\frac{\partial D_i}{\partial t_B} - \beta.\frac{\partial \Phi}{\partial D_i} - \frac{1}{2}.(t_A + t).\frac{\partial^2 \Phi}{\partial^2 D_i}.\frac{\partial D_i}{\partial t_B} - t.\frac{\partial \beta}{\partial D_i}\Phi = 0$

positive, depending on different factors. The numerator reflects the elasticity of the share of consolidated tax base for B to a change in the level of data collected in country $i = B, C$. That is affected by two different factors: (1) the marginal after-tax profits of an additional unit of data (i.e., $\frac{\partial \Phi}{\partial D_i}$) and (2) the change in β after a change in the data level collected (i.e., $\frac{\partial \beta}{\partial D_i}$).

The platform tends to increase the data in country i to respond to an increase in t_B if the following condition is satisfied:

$$\frac{\partial \Phi}{\partial D_i} > -\frac{t.\Phi}{\beta}.\frac{\partial \beta}{\partial D_i}$$

It is worth noting that the total effect of a change in the data level on the fraction of consolidated tax base depends on the sales elasticities to the data level.

$$\frac{\partial \beta}{\partial D_B} = \frac{D_C}{(D_B + D_C)^2} + \frac{\frac{\partial S_B}{\partial D_B}.S_C - \frac{\partial S_C}{\partial D_B}.S_B}{S^2}$$

$$\frac{\partial \beta}{\partial D_C} = -\frac{D_B}{(D_B + D_C)^2} + \frac{\frac{\partial S_B}{\partial D_C}.S_C - \frac{\partial S_C}{\partial D_C}.S_B}{S^2}$$

To sum up, it should not be easy for the platform to make a decision on how to adjust the level of data collected to respond to a tax change. It requires to account for different factors including the sales elasticities to the data level which then affect the sensitivity of the fraction of tax base to the data level, and the marginal after-tax profits of an additional unit of data.

CONCLUSION

Digitalisation is a key driver of the economy but it comes with new challenges to the international taxation system, leading a distortion between digital and traditional businesses while eroding tax revenues. While it is impossible to ring-fence the digital economy, it is time to adopt a new system to tackle digital taxation.

Many countries, including both the OECD and the EU, have raised digital taxation on their political agenda. Various unilateral measures have been taken including alternative applications of the PE threshold, withholding taxes and turnover taxes. It remains questionable on the efficiency of these measures, though.

On the other hand, a multilateral approach is far from seeing the light of the day in the near future. The OECD and the EU have proposed different approaches. The OECD remains in favour of separate accounting and the arm's length principle, strengthening the transfer guidance on intangibles to tackle new challenges arising from digitalisation. In contrast, the EU has recently endorsed to adopt a digital PE concept and formulary apportionment as a comprehensive approach to tackle digital taxation. Two bodies are different in terms of whether and to extent the participation and provision of data contribute to value creation in the digital economy. Unlike the OECD, the EU acknowledges the increasing importance of user contribution to value creation.

My thesis aims to strengthen my knowledge about the digital economy and tax-related issues arising from digitalisation. Another objective is to evaluate the efficiency of different tax measures taken by different countries. More specifically, I seek to answer the questions: whether separate accounting or formulary apportionment leads to a more efficient international tax system, and how the inclusion of the data factor affects the fairness of taxation, tax incidence and tax competition.

Through a careful study of different topics including two-sided markets, separate accounting and formulary apportionment, I arrive at the following key findings:

i. It is obvious that digital businesses heavily rely on intangibles, tend to centralise all core activities in a hub in a low-tax country and considerably benefit from user contribution (i.e., the data provision, user participation and user-generated contents) (OECD, 2018a). The heavy dependence on data and user participation leads to the

two-sided nature of many digital businesses. The interaction between customers of the two market sides generates cross-group network effects which affect price and competition strategies of digital businesses (Rochet and Tirole, 2003).

ii. Two-sided markets tend to subsidize agents who exert strong positive cross-group network effects or agents who are single-homing. Subsidizing means charging customers a price lower than marginal costs or even providing free access. The objective is to attract sufficient agents on the other side or agents who are multi-homing from whom the platform earns most revenues (Caillaud and Jullien, 2003).

iii. By virtue of cross-group network effects, two-sided markets may respond to tax measures in different ways compared to one-sided markets. Remarkably, a rise in *ad valorem* tax may increase sales while lowering prices for customers of both sides under certain circumstances (Kind et al., 2010). This finding supports the interim solution of the EU to impose a gross tax on certain income categories of digital businesses.

iv. Many digital businesses considerably benefit from data and user participation. While it remains a puzzle to determine the value of user contribution, free access should not be automatically viewed as equal to the privacy costs and nuisance costs that users would bear when accessing the platform. Accordingly, jurisdictions where users reside should be entitled to the taxing rights on profits derived from data and user participation.

v. The adoption of remote sales and the centralisation of activities in the digital economy exacerbate the BEPS practices. Digital businesses are characterised by intangibles and highly mobile income. The current profit allocation rules distribute profits from intangibles across the involved entities on the basis of the legal ownership of the intangibles, as well as on the basis of risk assumed and assets used. Digital businesses can easily manipulate the existing rules by transferring intangibles and centralising core activities in a low-tax country. Such arrangement allows digital MNEs to avoid PE status in market jurisdictions, shift income to a low-tax country and simultaneously avoid tax in the jurisdiction of the ultimate parent (OECD, 2018a). In short, most of their revenues are taxed at a low rate.

vi. The OECD recommends adjustments to nexus rules and updates on the transactional profit split method to deal with situations where controlled transactions involve

unique and valuable contributions or where operations are too highly integrated. Nevertheless, such recommendations seem too vague and cumbersome to apply. Both MNEs and tax authorities remain to bear huge compliance burdens.

vii. The EU has a different approach. The introduction of digital PE concept based on the measurable indicators (e.g., the number of users or contracts) seems more straightforward to determine PE status. The integration into the CCCTB may enhance the efficiency of profit allocation to digital PE. A four-factor formula, including the data factor reflects the contribution of data and user participation and secures tax base for high-tax countries.

viii. If the equally weighted four-factor formula is used, tax incidence would fall on the immobile factors and on agents who benefit from cross-group network effects.

ix. Under separate accounting, there exists a so-called phenomenon of “all or nothing”. That is a tax-favoured Member State obtains both real investments and most of the tax base while other high-tax Member States gain almost nothing despite their large base of users. Formulary apportionment with a data factor including formula would change the game considerably. Countries with lower demands from both market sides (e.g., users and advertisers in case of ad-financed platforms) would be reasonably expected to enter the race-to-the-bottom because their tax base will almost depend on the proportions of property and labour. In contrast, high-tax countries with the high numbers of users and advertisers have no longer motivations to reduce their tax rates. Instead, they are probably tempted to increase their own tax rates.

x. The response of a two-sided platform to a change in tax rate should be complicated under formulary apportionment with a data factor including formula. It is required to account for different factors including the sales elasticities to the data level which then affect the sensitivity of the fraction of tax base to the data level, and the marginal after-tax profits of an additional unit of data.

xi. While it remains controversial as to whether separate accounting or formulary apportionment leads to a fairer distribution of global income across countries, the latter would simplify the EU’s taxation system and reduce compliance costs.

The economy has evolved at a fast pace with new digital business models being expected to arise quickly. The current international taxation system seems outdated to capture the new reality. Hence, it is pressing to have a reform to ensure a level playing field between traditional and digital businesses as well as a fair sharing of the tax base from cross-border activities between jurisdictions. The EU's Digital Tax Package would make the EU a global leader to reform international tax law to tackle digital taxation.

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