LUISS

Department
of Economics and Finance

Course of Macroeconomic Analysis

Corporate Income Taxation in the Digital Economy: Challenges and Reforms

Prof. Pietro Reichlin
SUPERVISOR

Prof. Nicola Borri
CO-SUPERVISOR

Beatrice Pucci di Benisichi ID No. 718791
CANDIDATE

Academic Year 2020/2021

Abstract

In recent years, the corporate income taxation and its possible reforms for the digital economy have become an international debate. The current taxation system is not adequate for dealing with digital companies' complex business models. These companies, by relying on intangible assets, by being present in countries without having a physical presence and by collecting and using consumers' data, are able to pay much lower taxes compared to traditional companies. We are going to ask ourselves whether it is possible to avoid further tax distortions and challenges by reforming corporate income taxation. The goal of this thesis is to investigate digital companies' taxation challenges and to propose a simple model of corporate income tax reform. Through an analysis of digital companies' business models and their methods to pay lower taxes, as well as a study on data collection practice, which shows both the importance of data for digital companies and data collection impact on disinformation, we suggest some possible solutions. We first describe some methods to measure data value, but we find that giving a specific value to data is a complex task. Then, we illustrate a model to distribute taxable corporate income among countries where users are located and show a concrete application of the model. Our study reveals that our model will allow a fair distribution of taxable profits among countries, a consideration of the data value and a decrease of disinformation.

Acknowledgments

I would like to thank my two thesis supervisors, Gaëtan Nicodème and Pietro Reichlin for the precious advices they have given me in the elaboration of this master thesis and for their regular availability during the whole year. Both of them, from Brussels and Rome, have provided me with useful reading and writing suggestions and valuable comments. I wish to extend my thanks also to my family for giving me their support and encouragement as well as for their assistance in the proofreading and formatting of the final version of this thesis.

Table of Contents

Introduction

Nowadays, the developments in technology and digitalisation, together with globalisation, have permitted the creation and expansion of dominant and efficient digital companies. These companies are becoming more and more powerful, capturing an increasing part of economic activity. In the last years, the most valuable companies have changed radically. Bauer et al. (2019) argue that in 1990, the ten most valuable companies included mainly banks and traditional businesses companies, such as consumer goods companies. While, in 2021, in the top ten companies by market capitalization we find primarily digital ones. Namely, the GAFAM, which include Google (Alphabet), Apple, Facebook, Amazon and Microsoft. These companies, that today represent a large share of the economy pay less taxes than traditional companies. Being able to do so by engaging in profit shifting methods and by relying on business models which are incoherent with the current taxation system. This has led to the erosion of the tax base and a reduction of tax revenues for many countries. The Covid-19 pandemic has intensified the need to make a reform. With the economic crisis, governments collected revenues have and will decrease in the short and medium term, while digitalization will increase even more and digital companies have been placed in a favourable position compared to traditional companies. This will thus exacerbate the tax challenges arising from digitalization.

When corporate income taxes were formerly created, in the 20th century, the international economy was very different and simpler. Corporate taxpayers were mostly active in their country of residence and used tangible assets. Under such parameters, defining income owners, the place of value creation and the taxable value was a doable task. However, in the last decades the world has been completely changed. Today, multinational companies dominate the market. Digital exchanges with no physical presence have been facilitated and companies create value with hard-to-value intangible assets, such as intellectual property. Moreover, they are relying heavily on the collection and analysis of users' content and data, which have become core activities for value creation. The problem is that the current corporate tax system still relies on the concept of physical presence and arm's length principle, which are no longer reflecting the modern economy. Companies can be virtually present in some countries and offer services to consumers, taking advantage of public infrastructures and in particular, collecting users' data, while not having a taxable nexus in these countries. This situation gives a tremendous advantage to these kind of companies with respect to established ones, which are liable to higher tax rates. Moreover, digital companies' business models, lead to many externalities, such as the diffusion of fake news. Therefore, taxing digital companies will be a way, other than restoring fair taxation, to decrease such externalities.

The tax challenges linked to digital companies have different causes. Firstly, the location problem, companies can operate in a country remotely without having a physical presence and avoiding taxation. Then, their high reliance on intangible assets which are easily transferable from countries to countries and are difficult to value. Therefore, the first question that arises is where to tax these companies and how to reform the tax system to allow fair taxation and fair distribution of tax revenues among countries. Taxation is usually linked to the place of value creation and today digital companies mainly create value using data. Thus, the second question that arises is how to measure the value of data. Therefore, we will ask whether with the rise of digital companies it will be possible to avoid further tax distortions by reforming the corporate income taxation. For several years, governments and international organizations have tried to address digital companies' taxation challenges. Many innovative models of taxation have been proposed by economists and currently, the proposals of the Organization of Economic Cooperation and Development (OECD) as well as the ones of the European Union (EU) seem the more probable to be implemented. However, there is still no consensus among countries.

The aim of this thesis is to analyse the economic and digital context in which it will be necessary to introduce a new taxation system. This thesis is structured as follow. In the first chapter, the digital economy will be presented together with the challenges linked to the current tax system. The new business models will be analysed as well as the main issues for taxation and the main tax avoidance strategies used by digital companies. In the second chapter, the concept of data will be introduced. The concepts of how data are used by digital companies, the challenges raised by the data economy, and of how to possibly tax companies for their use of data, will be developed in this chapter. Finally, in the third chapter, some solutions to address digital companies' taxation will be presented. First, the proposals of the OECD, EU and the Destination Based Cash Flow tax will be investigated. Then a model will be illustrated together with its consequences.

Chapter 1: The digitalization phenomenon

1. New business models in the digital economy

This part starts by presenting the new business models adopted by the digital companies. These business models represent a challenge for the traditional corporate income taxation, because of digital companies' ability to perform activities in countries without being liable to tax.

a. Digital business models: main principles and characteristics

The digitalization phenomenon has brought about a radical change in how companies work and operate. Al-Debi et al. (2008) argues that the accessibility to information and knowledge have become essential elements to the success of a company. Indeed, companies have to adapt to this new era, they have to deal with constant improvement and development in technologies, in order to succeed. Therefore, it is fundamental that they improve their capacities to respond promptly by adapting their business models to this new era of digital business. In this first section, digital companies' business models will be analysed, and their main principles and characteristics will be presented.

A business model is defined as the way through which organizations create value (Amit and Zott, 2001), a way through which they generate income (Dubosson-Torbay et al., 2001). Timmers (1998) defines business model as the architecture for the organization, which includes the assets, the goods and services, and the information flow. Finally, Steinfield et al. (2002), describe business model as being a way through which a company allows transactions through the coordination and interaction among its members and subsidiaries. The rapid speed of technological progress has led to the decrease of information and communication technologies (ICT) costs, which in turn has led to the growth of the digital economy. Indeed, all sectors of the economy have adopted ICT in order to increase productivity, expand their market and decrease costs. These continuous changes and increase in competition have triggered a pressure on companies for innovation. Therefore, this widespread adoption of ICT in companies' business organization has allowed the development of new activities and companies across all sectors have built their business models around technology, efficiency and the goal to reach international markets. Nowadays, the role of the digital economy has become crucial, so much as to speak of a Digital Revolution. The Organization for Economic Cooperation and Development (OECD, 2017)[1] estimates that the internet usage rates in the countries' members of the organization, have increased from 59% in 2006 to 84% in 2016. Moreover, the number of digital

[1] OECD (2017), "OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation"

platforms users has increased a lot as well as the number of people who acquired online products or services. Regarding companies, most of them have adopted the digital technologies, in the European Union, in 2018, 77% of them have a website[2] and in 2019, 21% have sold products online.[3] Today, the main digital companies are called the Big Five or GAFAM, namely Alphabet (Google), Apple, Facebook, Amazon and Microsoft. These companies are experiencing a constant economic growth and are increasing their position in the market.

Table 1: Top companies by market capitalization[4]

Company name	Nationality	Industry	Rank +/-	31 March 2017		31 March 2009	
				Rank	Market Cap ($bn)	Rank	Market Cap ($bn)
Apple Inc	United States	Technology	32	1	754	33	94
Alphabet Inc-Cl A	United States	Technology	20	2	579	22	110
Microsoft Corp	United States	Technology	3	3	509	6	163
Amazon.Com Inc	United States	Consumer Services	-	4	423	NA	31
Berkshire Hathaway Inc-Cl A	United States	Financials	7	5	411	12	134
Facebook Inc-A	United States	Technology	-	6	411	-	-
Exxon Mobil Corp	United States	Oil & Gas	-6	7	340	1	337
Johnson & Johnson	United States	Health Care	0	8	338	8	145
Jpmorgan Chase & Co	United States	Financials	19	9	314	28	100
Wells Fargo & Co	United States	Financials	45	10	279	55	60
Tencent Holdings Ltd	China	Technology	-	11	272	-	13
Alibaba Group Holding-Sp Adr	China	Consumer Services	-	12	269	-	-
General Electric Co	United States	Industrials	11	13	260	24	107
Samsung Electronics Co Ltd	South Korea	Consumer Goods	39	14	259	53	61
At&T Inc	United States	Telecommunications	-8	15	256	7	149
Ind & Comm Bk Of China-A	China	Financials	-12	16	246	4	188
Nestle	Switzerland	Consumer Goods	-2	17	239	15	129
Bank Of America Corp	United States	Financials	69	18	236	87	44
Procter & Gamble	United States	Consumer Goods	-9	19	230	10	138
China Mobile Ltd	Hong Kong	Telecommunications	-15	20	224	5	175

Lack of physical presence

It is worth analysing now the key characteristics of digital business models, which are relevant from a taxation perspective. First of all, one important characteristic of digital companies is the lack of physical presence in the countries in which they carry out their commercial transactions. ICT development allows firms to perform economic activities all over the world without having a physical presence in the consumers location. This has led to a decrease in companies costs as well as an improvement in efficiency: it this thus possible now to manage the operations from another country. These developments are also beneficial for consumers who can have access to a wider market, increasing therefore their choices. Moreover, digitalisation has allowed a global value chain. Indeed, companies can locate different stages of their production across various jurisdictions and can have access to a greater number of customers all over the world. Therefore, these companies can have a

[2] Eurostat (2018), "Internet Advertising of businesses- statistics on usage of ads", Statistics Explained
[3] Eurostat (2021), "E-commerce statistics", Statistics Explained
[4] Source: Bloomberg and PwC analysis (2017)

significant presence in a country without being physically there. The lack of physical presence concept related to taxation will be analysed in detail in Chapter 1.2.

Multi-sided markets

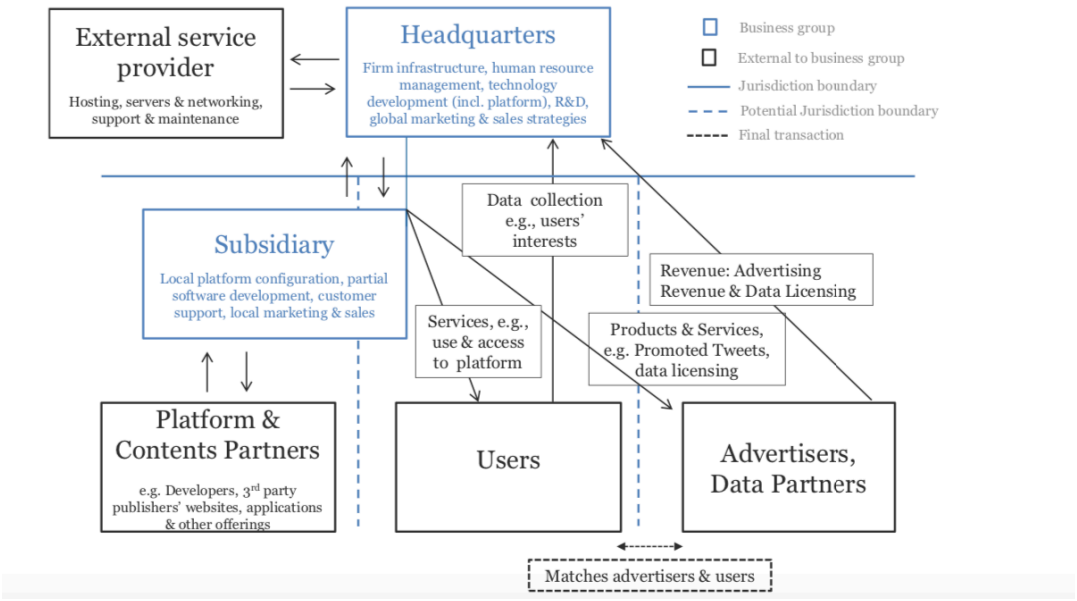
Secondly, the digitalization phenomenon has enhanced the creation of new companies which use multi-sided markets. Indeed, many digital firms have adopted multi-sided business models. In multi-sided business, there exist more than one group of customers. These are models in which many different groups of people interact with each other through a digital intermediary or a digital platform, and where the decisions and actions of any group influence the decisions of others through positive or negative externalities, therefore affecting the prices. The individuals belonging to a group can benefit from the interactions with the other groups. The possibility to create exchanges and interactions between various users of a group is one of the main elements of digital business, allowing to create huge potential for value creation. Rochet and Tirole (2003), argue that the concept of multi-sided markets has created the possibility to generate vast network effects. Indeed, multi-sided markets contain two main characteristics. First, the indirect network externalities and a non-neutral pricing strategy. Indirect network effects, that will be analysed in detail later in this section, take place when an increase of users in one group raises the utility of users in another group. Online platforms are fundamental to facilitating the communication of the multiple sides of the market. Therefore, Caillaud and Jullien (2003) argue that multi-sided businesses provide an intermediation service to join the different sides of the market. On the other hand, non-neutral pricing strategy implies that it is possible to adjust the prices on one side with respect to the price on the other side. In other words, it is conceivable to decrease prices for users on one side under the marginal cost, while increase prices above marginal cost for users on the other side. Indeed, the price is not neutral. This strategy has led many digital platforms to provide services free of charge for certain users. However, as it will be explained in the following sections, the service is not really offered for free but a barter transaction occurs where the services are exchanged with user data and user-generated content.

Reliance on users' data

In this view, another crucial characteristic of digital companies is users' participation, and in particular users' data. In order to have access to digital services and to conclude online operations and transactions, users have to share their personal data. These data are collected by companies that can benefit from their utilization to improve customers services and derive from it a monetary value. Firms can therefore analyse their customers data to offer a greater personalization of goods and services, as well as create new products and improve their business models. Data collection is a

resource used to create value for the companies, facilitating their operations. The interdependencies among customers groups imply that the more there are users on one side, the more data can be collected and sold, increasing revenues from advertisement. Therefore, according to Woodruff (1997), access to customers' information is a main source of value. Digital services are frequently offered with no direct charge to users, while their data are monetised to create personalised sales or advertising. The decision of how to allocate profit, as the value of user contributions is separately monetised - conceivably in a different country - and the determination of how data should be possibly taxed constitute two major challenges.

Figure 1: Schematic of a social network business model[5]



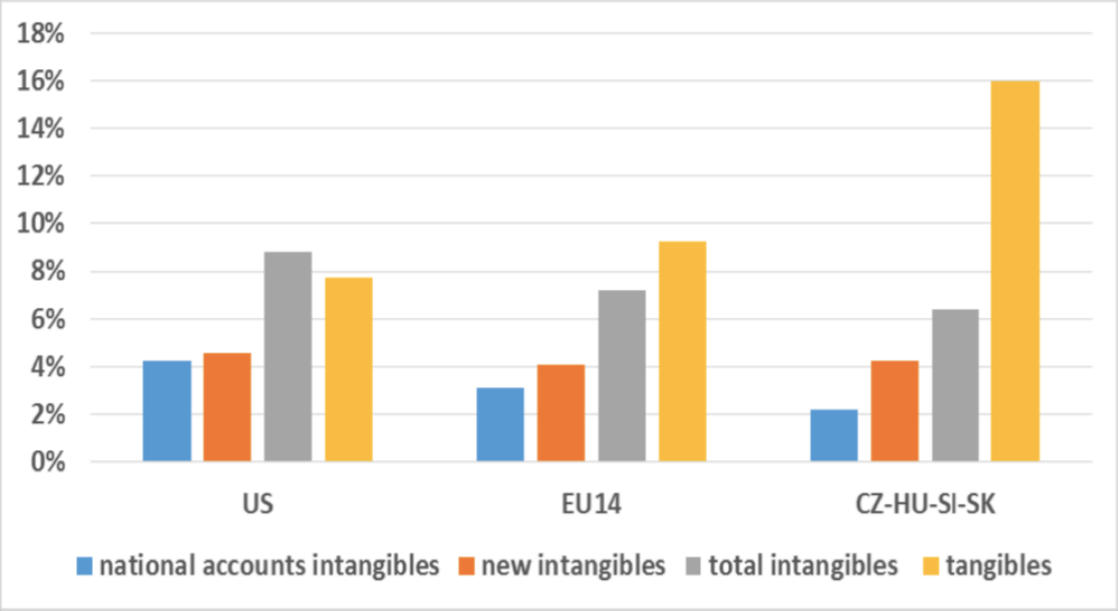
Use of intangible assets

Furthermore, intangible assets are becoming more and more important and digital companies mainly rely on them. Indeed, digital companies are investing a lot in intangibles, in particular intellectual property (IP) assets such as software and algorithms, which are becoming essential to their business models. According to Haskel and Westlake (2017), companies rely less on tangible assets, and are capable of operating and making profits even in the absence of traditional capital goods. Today, business investments tend to be concentrated in intangible assets, in particular in research and development, in marketing and in intellectual property (IP). However, this poses two problems: (a) there are no traditional counterparts to which intangibles can be compared to, and (b) these assets can easily be transferred to other countries. Karabarbounis and Neiman (2014) show that technology

[5] Source: OECD (2018), "Tax Challenges Arising from Digitalisation", Interim Report

developments have induced a decrease in the relative price of investment goods, resulting in firms shifting from labour inputs toward capital. Intangible assets are a key generator of business value and this is why the demand for IP rights faced an important growth in the last years. Corrado et al. (2009) show that in the last fifteen years in the United States, a parity between tangible and intangible assets as sources of growth has been reached. In Europe, the contribution of intangible assets to productivity growth is also important even if the European countries invest less in intangibles.

Figure 2: Intangible and tangible investment (% GDP, average 2000-2013)[6]



Thus, digital firms are characterized by their increasing reliance on intangibles that allow them to increase value and production. These intangible key value drivers are often owned and registered in countries with lower taxation rates for income derived from these assets. Therefore, the location of intangible assets is a crucial element with respect to taxation that will be analysed in Chapter 1.3.

The network effect

As seen before, one of the principal characteristics of digital business models is the network effect. A network effect can be defined as a phenomenon in which the more users or consumers enter the market, the more the value of the service offered by the company increases for users entering afterwards. Schilling (2002) explains that network externalities occur when the value for one side of the market increases as the number of individuals on the other side of the market increases. When markets are characterized by network effects, users' decisions and behaviours are considered to have

[6] Source: INTAN-Invest and authors' elaborations on national accounts.

a great impact in the creation of benefits for the other users. Even if the interaction with other users is not a primary need for users, the compatibility between them is important; indeed, many of them act and make decisions considering other users views. There exist two types of network effects: the direct and the indirect ones. The direct or same-side network effects as described in Katz and Shapiro (1985) imply that an increase in the number of users or customers leads to a direct increase in the product or service value for the same type of user. In other words, the utility for a specific user from the consumption of a particular good or service depends on the number of other users consuming the same product. These effects follow the Metcalfe's law, which states that, as the users of a network increase, the number of connections grows exponentially, thus also an exponential increase in the utility of the platform. They are therefore positive externalities in that the larger the network, the larger the users' utility. For instance, the online gaming platforms increase their value the more players they have. The indirect or cross-side network effects imply that an increase in the number of users leads to an increase in production of valuable complementary products, which in turn leads to an increase in the value of the product. More specifically, the increased number of users on one side of the platform increases the value of the product which is offered to the other side users. For example, advertisers in digital platforms can benefit from the increase of users in the platforms. These effects take place in multi-sided markets and might not always be symmetric or reciprocal. Indeed, increasing one side of the market might enhance the product or service for the other but the same might not be the case when the other side of the market is increased. The network effects have existed for a long time, long before the invention of the Internet, but the Internet has become a facilitator for them. Indeed, it has become less and less expensive for users to connect on digital platforms, and the platforms which are capable to attract mass of consumers have become particularly valuable thanks to network effects. By expanding in scale digital companies obtain a competitive advantage and acquire more and more market shares. Therefore, network effects can be considered as a competitive advantage for digital companies. It is argued that over time technological products and services might be easily replicated. However, it is far more complicated to replicate the network of users which are part of the platform. Indeed, the more the platform attracts users the more it becomes valuable. Another fundamental aspect of the network effect and the number of users in the platform, is the generation of data, which are in turn collected and used by the company in order to create a further value. Hence, the value of the network effect is given by the data produced by users and the exchanges among them. Therefore, the network effects have become fundamental in the digital economy and they allow digital platform business to become dominant in the market. This is indeed the case for the main platforms, namely Google and Facebook, which have benefited from network effects, using them as a competitive advantage over other similar platforms. Digital platforms can scale very

efficiently and can develop approximately to the total size of the market, creating therefore a monopoly.

Creation of monopolies

The monopoly characteristic is therefore central in the digital economy. Indeed, many digital companies are monopolies or part of an oligopoly. Digital companies can get a dominant position in the market in a very short time, through the combination of incremental costs and network effects, creating a tendency to becoming monopolies or oligopolies. In the digital era, the development of an intellectual property or a patent allows companies to create innovations, which could in turn increase even more the value and the comparative advantage of a company in comparison to its competitors. Because of the benefits of network effects, users prefer to use a single platform, but the price for the other side of the market, such as advertisers, rises since the platform does not face competition. Brousseau and Penard (2007) argue that the existence of dominant platforms may be better than multiple platforms competing with each other, because a monopoly is better able to provide its service to both sides of the market. It is arguable that creating monopolies can also be a risk for the economy. A monopoly may in fact, impede the entry in the market by other companies or exploit consumers. In the last years, many large digital companies, such as Facebook, has engaged in many mergers and acquisitions of young start-ups. Prat and Valletti (2019) argue that large platforms want to retain their customers and providing them with new products can be beneficial. Moreover, the inputs provided by the start-ups, such as patents, algorithms or users may also be attractive for platforms. However, some digital companies engage in mergers and acquisitions to decrease competition and increase their position in the market. Crémer et al. (2019) explain that at the time of the merger, start-ups are usually small and their products are different from the ones proposed by the incumbent platforms. However, in the digital context, with fast innovation and developments, it is possible that start-ups' user-base increase rapidly, resulting in a potential competitor of the platform. Thus, the acquisition of innovative start-ups is a way to reduce future potential competition. Mergers in which platforms acquire small start-ups, whose products and user base can compete with theirs in the future, are called killer acquisitions, since they eliminate competition. Another risk of monopolies is the risk of influencing consumers. Indeed, digital companies that possess a large part of the market may by distributing some contents and some information, control their users and the market in general. The risk for consumers of digital monopolies is no longer a risk of prices that are too high due to a lack of competition, as it is the case for non-digital monopolies, however, consumers are "paying" a large amount of personal data, allowing digital companies to excessively influence and control the flow of news and information the users obtain.

Considering the main principles and characteristics of digital business models, it is apparent that the main element connected to taxation that characterizes these models is, firstly, the lack of physical presence, thus the possibility to get users from all over the world. Secondly, another important element that characterizes these models is the collection of users' data. Data are indeed the main comparative advantage that digital companies have on traditional companies and are one the key value creation factor. Users are therefore fundamental for these companies as well as the contents they create. However, even though the prices that consumers face are very low and that they benefit from network effects, these monopolies can also be a risk for them, in particular concerning the spread of fake news and the control and manipulation of their data. This issue will be later analysed in Chapter 2.

b. Examples of digital business models[7]

There exist many different digital business models that characterize the new digital companies. However, only four of them will be discussed in this section since they are considered the most relevant with respect to taxation challenges in the digital economy.

E-commerce

First of all, the electronic commerce, or e-commerce business models will be analysed. E-commerce is defined by the OECD (2011)[8] as the mechanisms of selling or purchasing products online, over computer networks through devices that have been specifically created to receive or place orders. Therefore, the products are ordered online but the payment and delivery can be made in a more traditional way. E-commerce has grown fast in the last 15 years, but as technologies continue to evolve at exponential rates, e-commerce opportunities are always different. E-commerce activities use the Internet and the Web in order to perform business operations and enable commercial transactions between organizations and individuals or among themselves. In comparison with traditional business models of commerce, e-commerce brings central developments and revolutions. Indeed, in traditional commerce, customers have a passive role and there is more information asymmetry between buyers and sellers. Moreover, traditional commerce requires a physical place where the exchanges take place. On the contrary, e-commerce is available everywhere and at all times. Thus, it has a global reach across national boundaries. Furthermore, the amount and quality of

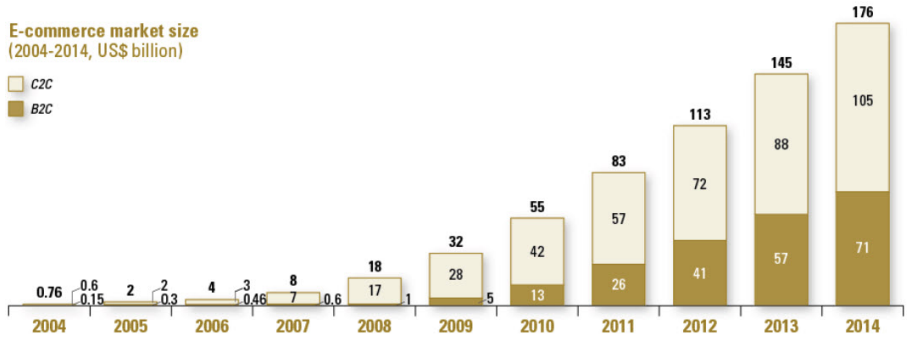
[7] OECD (2014), "Addressing the Tax Challenges of the Digital Economy", Chapter 4: "The digital economy, new business models and key features"
[8] OECD (2011), "Guide to Measuring the Information Society"

information related to the products are very rich, since as explained above customers benefit from the network and from the other users. Additionally, thanks to the high collection of users' data, products are much more customizable.

There are different business models that characterize e-commerce which depend on market relationship. Firstly, there is the business-to-business (B2B) model and in this case all the participants are businesses or other types of organizations. A large part of e-commerce activities, approximately 57%[9], consists of business-to-business transactions in which a business sells goods and services to another business. The OECD states that the main products which are sold in order to support other businesses include logistic services such as transportation or distribution products, application services which provide hosting or management, support functions such as webhosting or customer care solutions, auction solutions, content management services and others. Secondly, the business-to-consumer (B2C) model is an e-commerce model in which businesses sell goods and services to individuals without a professional scope. This model is one of the first usage of e-commerce and includes numerous categories, such as the pure online vendors, who do not have any physical presence, the click-and-mortar businesses, which provide e-commerce activities as a supplementary marketing channel. Indeed, they supplement existing customers with online sales and online customization of products. The goods and services offered in business-to-customer models can be both tangible and intangible. Digital business models can significantly reduce the supply chain; indeed, they do not need wholesalers or retailers in the countries where they sell their products. On the contrary, they tend to invest more in customer care activities, such as increasing access to information, or in personalized advertisement. Therefore, the main investments of digital companies seem to be on customers related operations, which are, as explained before, possible because of data collection. Thirdly, there is the consumer-to-consumer (C2C) business model in which consumers sell products directly to other consumers. This business model is the more recent one, but it is becoming increasingly widespread.

[9] Eurostat (2021), "E-commerce statistics", Statistics Explained: "In 2019, web sales accounted for 7% of the total turnover of the enterprises. Of this, 4 % came from web sales to other enterprises and public authorities (B2BG) while 3% came from web sales to private consumers (B2C)"

Figure 3: E-commerce market size[10]



The digital companies using this kind of business model are only acting as intermediaries between individuals. They support some individuals to sell their products and other individuals to buy some products, by facilitating their matching, by publishing and spreading their information and easing transactions. It is arguable that in this type of business model collecting users' data seems to be essential to the well-functioning of the business. E-commerce activities have been possible because of the creation of the Internet. Thanks to digital developments many transactions can be conducted more efficiently and with lower costs. It is now possible for large companies but also for small and medium-sized ones to have access to a worldwide market. Consequently, Laudon and Traver (2013) assert that the number of companies carrying out activities over the web and the number of e-commerce transactions have increased sharply since the first e-commerce transaction in 1995. Statista (2021) estimates that the size of total worldwide e-commerce revenue will be equal to 6 trillion dollars in 2022. Yapar et al. (2015) show that e-commerce sales have increased by 21% in 2014 compared to the previous year and expect them to increase for more than 10% for every subsequent year. Relating to taxation, it has become more and more difficult to establish the location in which to tax e-commerce activities. Indeed, determining sellers and consumers location over the Internet is very complex and tax revenues have been lost. Moreover, without the need of a physical presence, it can be even harsher for jurisdictions to determine taxation location.

[10] Source: Goh M.F. et al., "China's e-commerce market: the logistics challenges", A.T. Kearney.

Figure 4: Retail E-commerce sales revenue worldwide (Billion USD)[11]

Digital platforms

A second important digital business model is the digital platforms' model. Digital platforms have the function of facilitating interactions and exchanges across their users. These interactions can be short-term transactions such as the sale of products or long-term collaborations. The objective of the digital platform is to allow interactions and to create and benefit from network effects. There are different types of platform business models, such as aggregation platforms, which support users in finding appropriate goods and services. Another type of platform is social platforms, which combine users together and support relationship networks. Finally, there are mobilization platforms which combine individual or organizations together to achieve extended business processes. These platform business models are multi-sided platforms, which include different users' groups. The users on one side of the platform create value for the users on the other side. The interactions are the fundamental goal of the platforms, since they are the first source of revenue, but to achieve them it is necessary to define the users and to have access to their information, preferences and characteristics. There are two main users of digital platforms: the consumers who consume the goods and services, and the providers who sell the products. The platform success relies on its ability to match them and to benefit from network effects created around these interactions. Hence, a platform can have a comparative advantage over another platform if it is able to correctly manage, analyse and use users' data. From a competitive point of view, digital platforms tend to become monopolies and competition can be difficult. Indeed, Caillaud and Jullien (2003) argue that it is challenging for a start-up digital platform to enter the market since it requires individuals on both sides and none of them is willing to enter until someone in the other side has entered. Therefore, the incumbent platforms that already benefit from a large network usually have dominant position in the market. Cennamo and Santalo (2013) show the

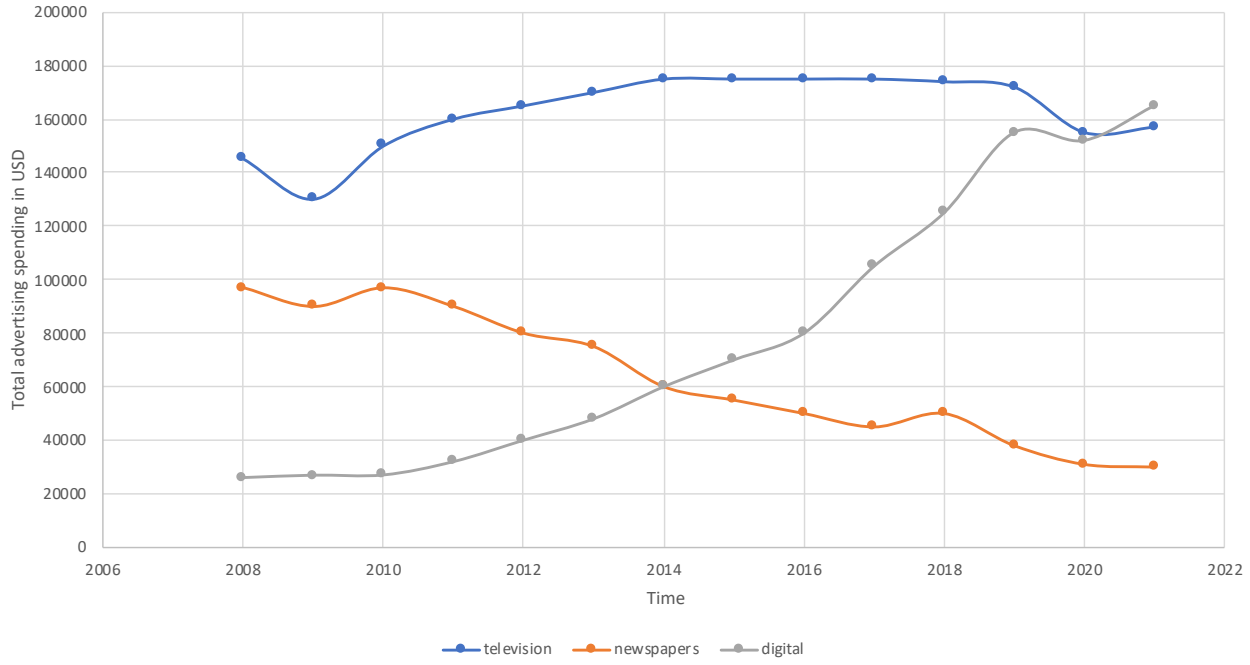
[11] Source: Fang J. X., Xu D., (2020), "How the Internet Influences the Development of Modern Market Economy", in *American Journal of Industrial and Business Management*, 10, pp. 1002-1012.

importance of the "winner-takes-all" effect of digital platforms. Digital platforms tend to be monopolies that could in turn lead to the problems and challenges on users that have been previously explained.

Online advertising

A third business model of the digital economy is online advertising. This model uses the Internet in order to target and distribute advertising contents to customers. Thanks to advanced technologies advertisers can segment consumers to allow more accurate targeting of ads.[12] Moreover, they can use data about users' interaction with their brands, and users interests and preferences. Usually, online advertisers pay a particular digital platform to distribute their ads and to appear in users search results. Advertising network intermediaries include numerous actors and are supported by data exchanges. Indeed, advertisers buy users' data from platforms that trace users' online activities and collect their data. Efficient advertising companies combine a large network of users with complex algorithms to collect, analyse and use users' data to allow targeted advertisement. Today Internet advertising represents the largest advertising channel, surpassing both the television and newspaper advertising channels.

Figure 5: Total Advertising Spend



[12] OECD (2014), "The digital economy, new business models and key features".

Schumpeter (1942) uses the concept of "creative destruction" that can be well be applied to this new form of advertising. Indeed, newspapers, which were the main sources of advertisement, are slowly being replaced by online news and thus by digital advertising. Online advertising represents the main source of revenues for some of the major web-based companies in the world (see Annex), namely Google, Facebook and Amazon, which sell online advertising to their users and are therefore also advertising companies, in addition to being communication platforms or internet search engine platforms. Google, Facebook and Amazon represent an oligopoly in the online advertising industry, since their combined advertising revenue represents 70% of global digital advertising spending. Digital sellers use online advertising in order to channel consumers directly to their own websites, where they can buy products. Thus, online advertising business model also apply in a two-sided market, where platforms facilitate the interaction and the exchange between advertisers and consumers. Evans (2009) suggests that online advertising processes are leading to a substantial reduction in transaction costs between buyers and sellers, but in doing so online advertising models collect and process users' data and their movements on the Internet. In fact, online advertisers tend to know much more about their consumers than traditional ones. They know whether the consumer has clicked on the website, how much time she/he spent at looking to the ad and so on. Apart from direct ad connected information, such as data obtained by companies using Facebook for Business which analyses statistical ad related data for companies, online advertisers also know private and detailed information about consumers, such as their location and their previous searches. Thanks to this knowledge, advertisers will send targeted messages and contents to consumers. It is arguable that online advertising business models reduce costs and transactions used in order to match specific buyers and sellers. Moreover, it increases the accuracy of the match. Therefore, users' data are essential for targeted advertising and constitute a value for the online advertising companies.

Cloud computing

The last business model that will be presented is cloud computing, which is the provision of digital computer services. These services include data storage and management, software and computing. Users can access these services from every location since the service is provided online. Moreover, their data, resources and software will be located in many networked computers, so that a possible failure of one computer will not lead to a loss of data. Indeed, cloud computing is a service offered to consumers to maintain their IT infrastructure. Cloud computing benefits from economies of scale since the more users it has the more it has resources such as space and processing power shared among these users. There are various cloud computing business models such as Infrastructure-as-a-service, in which sellers offer computers and computing, network and resources. It allows users to scale and

reduce resources depending on their necessities, decreasing the need for high initial capital expenses or unnecessary IT infrastructures. The second type of business model is the Platform-as-a-service, in which sellers provide computing platform and programming tools that develop, test, implement and manage business applications for users. Thus, customers do not need to purchase, configure, optimize and manage hardware and software. Another kind of business model is the Software-as-a-service, which allows users to connect to and use cloud-based applications from numerous devices, such as email, calendars and productivity tools, through a web browser. This model allows companies to be rapidly operative with an application with minimal upfront costs. A last model is Data-as-a-service, in which the data coming from multiple sources are managed by a service provider, so that it guarantees access to those data from many different locations, without the need to acquiring the necessary infrastructure.

2. Tax challenges raised by multinational digital companies

These new business models raise concerns on whether the traditional tax framework is still correctly addressing the present economy. In this part, the current elements of taxation will be presented and put into question.

a. Fundamental elements of taxation in a multinational context

In a globalised world, firms expand over many countries, investing abroad and splitting their production across different locations. Indeed, in the last decades, many firms have become multinationals. They have affiliates in different countries, usually countries where labour costs are lower. However, production costs are not the only incentive to locate a subsidiary company, there can also be tax advantages. Multinational corporations are divided between the parent company and one or more subsidiary companies. Barrios et al. (2012) explain that both subsidiary and parent country taxation matter. Moreover, they argue that parent firms tend to be located in countries with a relatively low taxation of foreign-source income. The question arises of how to tax multinational firms, how to tax them in the different locations to avoid double taxation and allow a fair distribution of profit among the jurisdictions. The country where the firm is firstly established is called the residence country, while the other country where the main activities and operations take place is called the source country, which is the host country of an investment. More specifically, Avi-Yonah (2007) explain that the source country refers to the jurisdiction in which income is created. While the residence country denotes the jurisdiction in which the income's receiver or owner is resident for tax

purpose. Today the allocation of taxing rights between the source and residence jurisdiction remains the central feature of international tax policy. At the time when the international tax system was created, the main components of income were tangible and immobile assets, thus determining the source country as well as the residence country was an easy task. Moreover, companies were usually operating only in their national or local markets. However, globalization completely revolutionized these concepts. Desai (2009) argues that the liberalization of trade and the increase in competition led to the creation of multinational companies as companies continue to maximise the opportunities generated by international markets. This process led to a fragmentation of the global value chain.

In order to determine the taxation of multinational firms, international tax treaties use the concept of Permanent establishment (PE). It defines the main mechanism in which a source country can claim tax from a firm based in the residence country. International tax treaties rely on the definition of PE exposed in the article 5 of the OECD Model Tax Convention on Income and on Capital: *"Permanent establishment means a fixed place of business through which the business of an enterprise is wholly or partly carried on."* The definition indicates many necessary factors to consider the location a permanent establishment. Firstly, there should exist a place of management which can be a branch, an office, a factory, a workshop or others. Moreover, this place of business should be fixed and should last more than one year. In order to determine the physical presence in a country there should be the presence of staff, the use of public goods, infrastructures or the completion of a full business cycle. On the contrary, some activities are exempted from the application of the permanent establishment rules. The term permanent establishment does not include the use of locations uniquely for storage or delivery purposes, the maintenance of a fixed place of business uniquely for purchasing goods, collecting information or carrying on preparatory or auxiliary character activities. These activities are usually denoted as ancillary activities.

Nowadays, due to the rise and expansion of the digital economy, more than 135 countries joined and approved the OECD's Inclusive Framework on Base Erosion and Profit Shifting (BEPS) and the connected BEPS Action Plan, which has recently reformed the definition of permanent establishment, in particular in respect to the exclusion rules. Indeed, many firms have used the ancillary activities rule in order to split the activities into separate affiliates and avoid paying tax in the specific location. Therefore, this new rule ensures that, even though activities seem auxiliary or preparatory when isolated from the other business activities, if they are complementary activities that are part of a business operation, then they are not ancillary and the exception rule is not applied. The creation of the Internet and the spread of e-commerce have raised many concerns about the use of permanent

establishment as it is defined in the OECD model. Indeed, before the phenomenon of digitalization, a physical fixed place was necessary to conduct business operations, while today thanks to the technology, firms can conduct cross-borders operations without establishing a physical presence in any country and therefore without being taxed. Under the principle of permanent establishment, the various jurisdictions in which a multinational firm has affiliates will collect tax. In order to determine the tax revenue of each location, international tax treaties rely on the separate entity accounting principle defined in the article 7 of the OECD model. The article argues that the profits of an enterprise are taxable only in the residence country unless the enterprise carries on business in a source country through a permanent establishment. Then, the profits may be taxed in the source country but only for so much of them that are attributable to that permanent establishment. The profits will be allocated among the countries as if the enterprise was separated in two or more distinct and independent enterprises. In other words, the permanent establishment is considered to be a separate and independent enterprise and not an affiliate of the parent firm. Moreover, the profits attributed to a permanent establishment will be determined based on an apportionment of the total profits of the enterprise to its various parts. In a globalized world, multinational firms tend to focus a lot on intra-firm trade. Indeed, today two third of total world trade is realized by intra-firm trade. In order to regulate trade between affiliates the international tax treaties rely again on the OECD Model Tax Convention. In particular, they use the concept of arm's length principle which is defined in the article 9. This principle oversees the prices at which intra-firm transfers are set for tax purposes. In other word, it states that the price charged in a controlled transaction between two elements of the same firm should be the same as the price charged in a similar transaction occurring between two independent enterprises on the open market. Such transactions are usually made of intermediate goods, which are produced by one affiliate firm and sold to another or can be a license or royalty paid for the right to use intellectual property, which is owned by another affiliate.

The arm's length principle has been created in order to prevent profit shifting by manipulation of transfer prices within a multinational firm, and this will be explained in Chapter 1.3. However, the arm's length principle has been recently challenged as it is very complicated to apply, in particular since it cannot always be simple to determine the price, especially now with the rise of intangible assets which do not have a price on the open market.

b. Tax challenges of the Permanent Establishment concept in the digital economy

Multinational companies operating in the digital economy have experienced a significant expansion, also thanks to their own fiscal policies, which exploit their business models characteristics and the

regulatory weaknesses in the taxation of the economy. As explained above, taxation is still strongly related to physical presence which is often inexistent in digital companies. These ones are characterized by a high degree of dematerialization and can easily avoid establishing a physical presence in a given country and gaining taxation advantages. In a world characterized by digital economy, it has become more and more difficult to decide whether firms which operated in certain countries without having the physical presence necessary to have a permanent establishment are subject to taxation in these countries. According to international tax treaties, there must exist a considerable relation between a jurisdiction and a company's activities in order to establish a nexus in that jurisdiction, allowing the jurisdiction to tax the company's income earned from sales in that country. However, multinational digital companies, can earn income from sales in a country without being liable to tax in this country, thus avoiding a permanent establishment, as the sales are made through the Internet which is not a physical place.

Nowadays, to apply taxation it is necessary to determine a physical presence and a permanent establishment. However, in 2014, the OECD[13] explained that the Internet web site does not represent a permanent establishment since it does not constitute a fixed place of business, with machinery and equipment. On the contrary, the server, which is essential for any operations that take place in the digital world, is characterized by a degree of materiality and can therefore represent a fixed place of business. Thus, to establish a fixed place of business, the server must be located in a specific place for a period of time sufficient to become fixed. Another condition for representing a permanent establishment, is that the functions carried out through server must be significant and essential for the performance of the company and therefore must not be only auxiliary or preparatory activities. Therefore, this taxation system is not really adequate to tax digital companies, which could easily implement fiscal manipulation techniques by placing their servers in low-tax countries. An opportunity offered by technology advances could be to locate a server in a low-tax jurisdiction and to fragment diverse business operations between various servers. These practices enable foreign enterprises to take part into a country's economic activity without reaching the permanent establishment threshold. Additionally, with the Internet development it can be difficult, maybe even impossible to trace the location from which transactions are carried out. Companies operating in many sectors of the industry have customers in a country without permanent establishment, and communicate with them via phone, e-mail and independent agents. Therefore, the current concept of

[13] OECD (2014) Model Tax Convention, "Commentary on Article 5 Concerning the Definition of Permanent Establishment"

residence is also vulnerable to tax manipulation. Indeed, the residence is the place where the company is managed; however, new communication tools such as video conferencing would allow board meetings to be held at the same time in different countries. As noticed by ZEW (2017)[14], value creation and taxation locations can diverge. This might lead to artificial profit shifting to countries where no value is created and to digitalised business models profiting from a lower tax burden. For the purpose of taxation, it is necessary to determine the origin of the resources used to create value and the place where they have been put together or combined. The international tax system is based on the separate entity approach and entities have the right to use assets whether they have been created or acquired by them. The income of a company is divided across the entities in relation with the use of resources. However, the main tax concern arises when corporations transfer assets from one entity to another in order to profit taxation manipulation, by transferring much of the resources to entities located in low-tax countries. Moreover, international tax system was created for products produced in a single country and with value components that were also created in other single states, while with the digital economy the final products or part of the value may be created at the same time in many different territories, which is the case of multisided platforms. Thus, profits have a multi-country origin and the value addition model cannot be applied since it is impossible to determine a single country where value was created or added.

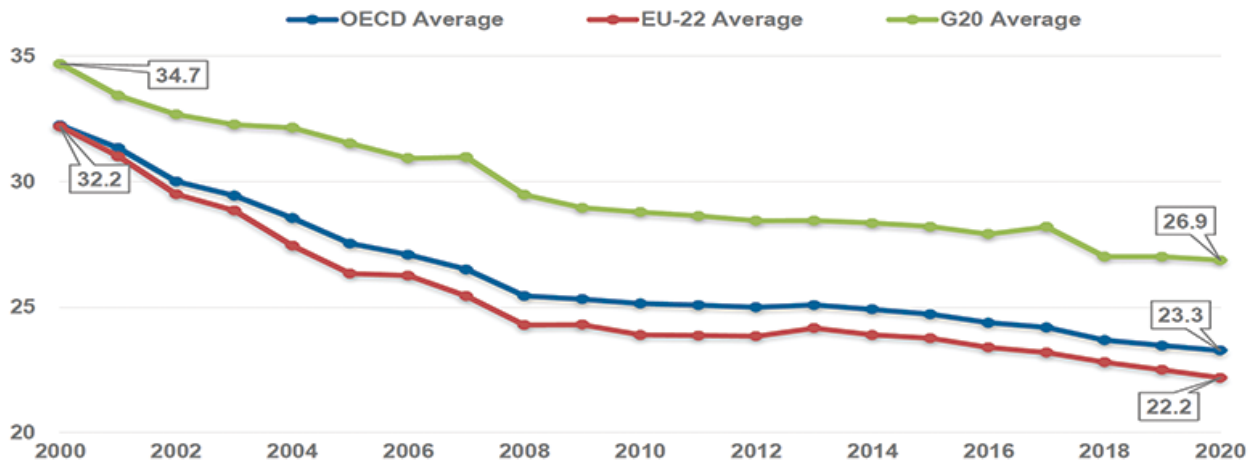
c. Tax competition among countries: a race-to-the-bottom phenomenon

Tax competition among countries has existed long before the advent of digital companies. With market liberalization, capital and labour became freely mobile across countries, leading these last ones to compete with each other for business investments and tax revenues. According to the World Investment Report (2015) European Foreign Direct Investment (FDI) increased from USD 21.7 billion in 1980 to USD 824 billion in 2007, showing a reorganization of the international market with more and more investments in foreign countries. Different corporate income tax rates have led to tax competition and to a race-to-the-bottom. Indeed, countries are decreasing their corporate income tax rates to attract more investments and tax base. This tax competition represents an inefficiency for the international economy, by decreasing tax revenues for countries and leading to a tax base erosion. Candau and Le Cacheux (2018) use EU15 countries, in order not to bias the results by taking into account low tax rates of new EU countries. They compute revenue losses from corporate income taxation and find that countries that lose the most are Germany, France and Italy.

[14] ZEW (2017), "Digital Tax Index 2017: Locational Tax Attractiveness for Digital Business Models"

The following graph shows the evolution of the average statutory corporate income tax rates in developed countries. The rates decreased strongly between 2000 and 2020 proving competition among countries and a race-to-the-bottom phenomenon. Countries on average decreased their corporate income tax rates by 10 percentage points. With the average above 30% in 2000 and below 25% in 2020.

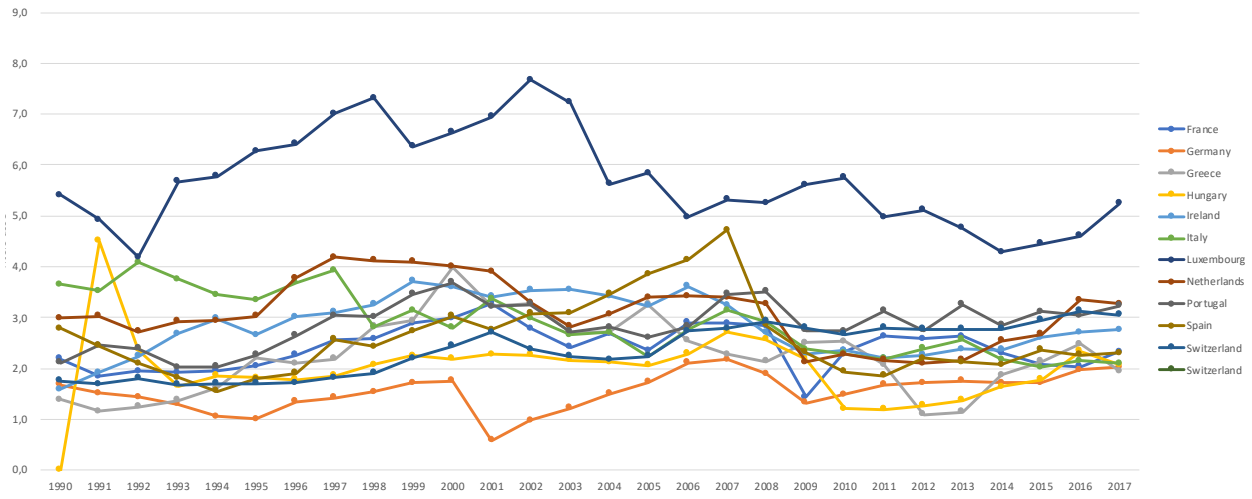
Figure 6: Combined statutory CIT rates. (%)[15]



The Primarolo Report (1999)[16] explains that tax competition in Europe might be harmful for the economy. Therefore, the European Union adopted some measures, such as the Code of conduct, to limit tax competition. However, Davies and Voget (2008) show that tax competition has continued to increase even after the measures, as it is shown in the figure. However, evidence shows that the decline in corporate tax rates is not associated with a decrease in the tax-to-GDP ratio. Devereux et al. (2002) examine corporate income tax revenue as a percentage of GDP, for OECD countries over the period 1960-1999 and show that while statutory tax rates have been reduced, tax bases have been broadened and revenues as a percentage of GDP have remained constant. Similarly, Sorensen (2006) find analogous results for the period 1982-2004. De Mooij and Nicodème (2008) show that an element that could explain the stability of corporate tax revenues, with respect to a decline in statutory tax rates, is the income shifting phenomenon, from the personal income tax to the corporate income tax, through an increase in the firms' incorporation level. Finally, Kawano and Slemrod (2016) observe that countries which are reducing their corporate income tax rates and also increasing the tax base.

[15] Source: OECD, Tax database
[16] Primarolo D., (1999), "Code of Conduct (Business Taxation)". Report European Commission.

Figure 7: Tax revenue as a % of GDP



The graph shows for some European countries the evolution of corporate income tax revenue as a percentage of GDP overtime, which is stagnant. Therefore, as proved by evidence and as described in the literature, corporate income tax revenues as a share of GDP are do not show a long-term change over time. This proves that corporate income tax base should have been broadened, mostly because of globalization. Nowadays, profit has become much more mobile and competition to attract investments and tax revenues has increased.

The following two graphs show the difference between statutory corporate income tax rates and tax revenue as a percentage of GDP. The first one illustrates the different tax rates in the OECD countries, which are very heterogenous. The second one shows tax revenues in the same countries, which also present great variability. From the graphs, we can observe that some countries with very high statutory corporate income tax rate, such as France, have small revenues as a percentage of GDP. While other countries, such as Luxembourg, have very high revenues with respect to its low tax rate. Countries with smaller tax rates such as, Ireland are attracting many digital companies, which establish in these countries to pay lower taxes, leading to unequal revenues profit in European countries. Therefore, foreign companies are mainly establishing in European low-tax countries in order to serve the European market. Thus, national companies are at a disadvantage with respect to foreign companies, in particular digital ones, which more easily operate in countries without having a presence.

Figure 8: Statutory CIT rates, OECD countries, 2020

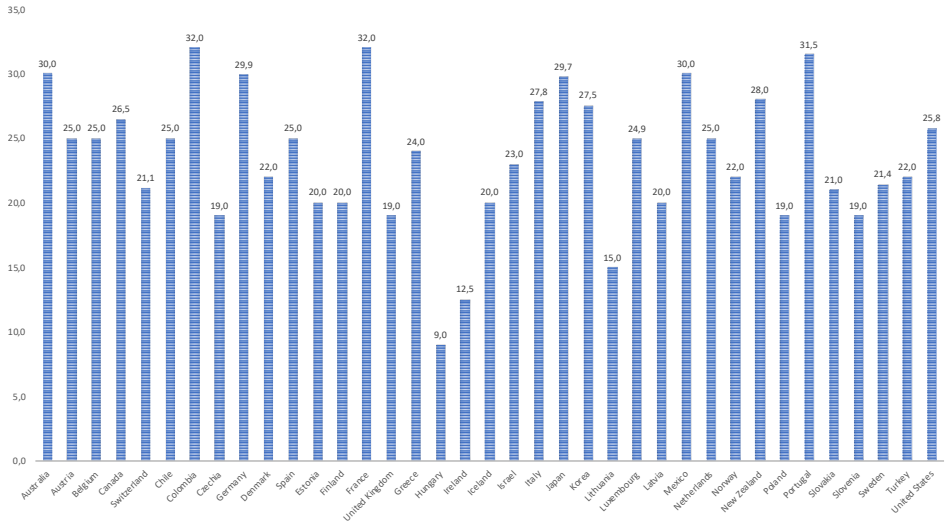
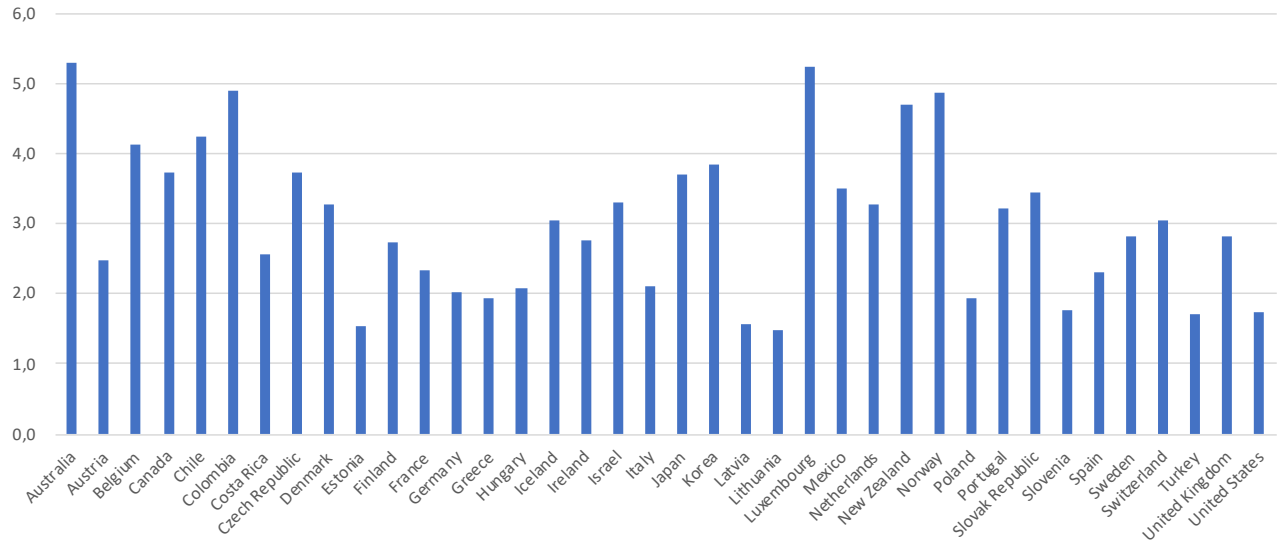


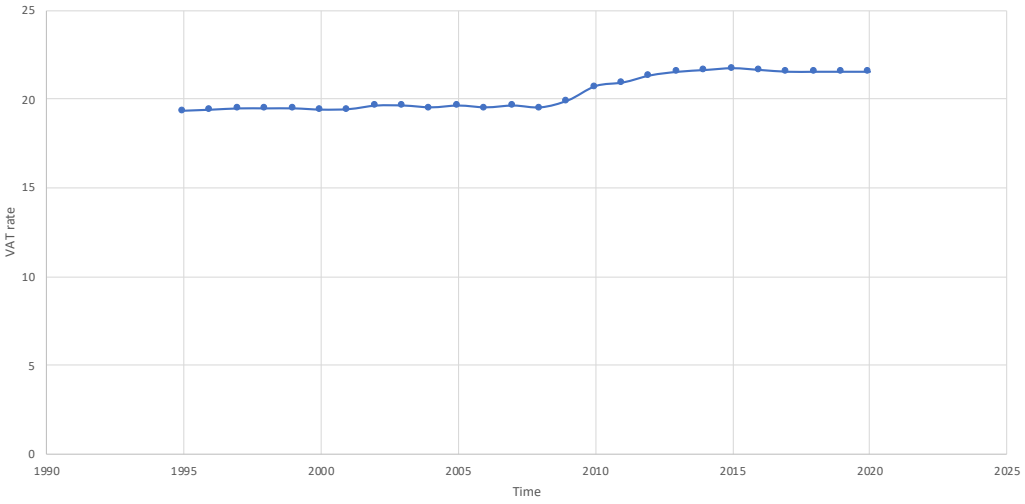
Figure 9: Tax revenue as a % of GDP, OECD countries, 2017



In the last years, the international tax system has been further put under pression because of the rise of digital economy. The new technologies increased productivity and profitability, allowed companies to be located everywhere and reduced costs, accelerating the spread of multinational companies and their supply chain fragmentation. Thanks to the digital developments and progress and in particular to the reliance on intangible assets, the international mobility of foreign investment has been facilitated. Indeed, intangible assets are much more mobile than tangible ones. Leading digital multinational companies to allocate their assets in a way to reduce their tax burden. Vallespinos (2020) explains that in response to this phenomenon, countries have the incentive to change their international tax rules and modify their bilateral tax treaties in order to maximize their

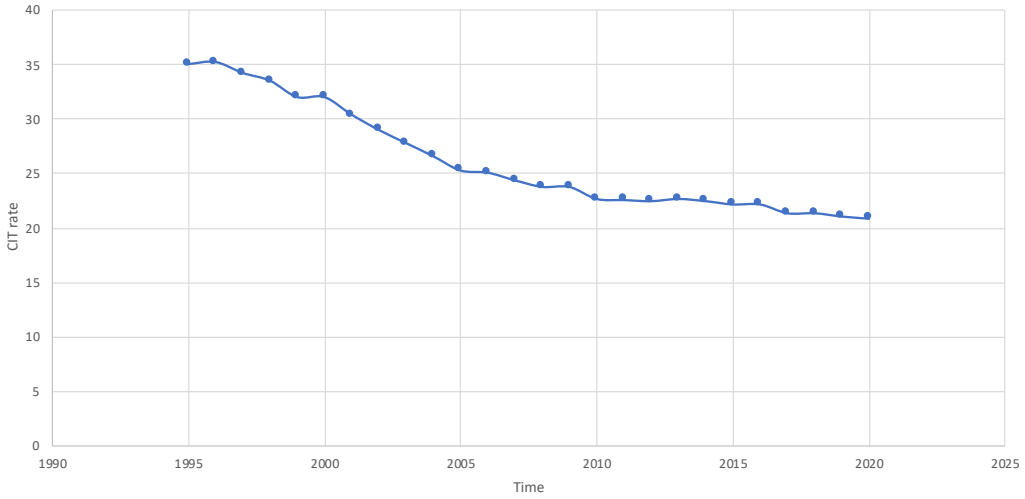
national revenues. Their main objectives are to attract foreign investments and to receive a larger share of global tax revenue. An argument used to prove the efficiency of reducing CIT rates is that it will allow for higher workers incomes and cheaper goods. However, De Loecker et al. (2020) find that in the US, the labor wages have declined due to an increase of companies' markup, thus, of companies' power. In the last years, and especially after the global financial crisis of 2008 and the European crisis of 2009, we can observe that the race-to-the-bottom of corporate income tax is accompanied by an increase in the VAT rates. The following two graphs represent both situations. The first graph shows European Union average VAT rate, while the second graph shows European Union average CIT rate. This proves that many remedies to collect revenues have been put in place by governments. Enlarging tax base and increasing VAT rates, as well as social security contributions, in order to compensate from the decrease in corporate income tax rate. However, many foreign companies, and in particular digital ones and not paying their fair share of tax, being subject only to low corporate tax rates, while taxation is affecting countries inhabitants.

Figure 10: EU average VAT rate evolution[17]



[17] Data taken from the EU Commission

Figure 11: EU average CIT rate evolution[18]



In Europe, corporate income tax rate differences lead multinational companies to take advantage of their digital business models to allocate their profit in low-tax countries. In the Italian Facebook example, national advertisers paid for advertising directly to Facebook Ireland Limited, which is the owners of the invoices and thus the turnover arrival location. This company then recognize a small part of revenues to the Milan affiliate company in the form of commissions for provision of sales support and marketing services to the group. Thanks to this method, the profits and taxes of the Italian affiliate remain very low, while the real value is shifted from the internal market to Ireland, benefitting from a reduced corporate income tax.

3. Profit shifting as the main tax distortion of multinational companies

In this part, the inconsistencies between the business models and the current tax system will be highlighted, presenting the main techniques for avoiding tax by digital multinational companies.

a. Transfer pricing

The increasing importance and dominance of multinational companies have raised some challenges in the collection of corporate income taxes. Indeed, in recent years, multinational companies have taken advantage of the situation and are able, with their new business models and through various techniques and strategies to avoid or reduce taxation. The main method used is by shifting their profits

[18] Data taken from the EU Commission

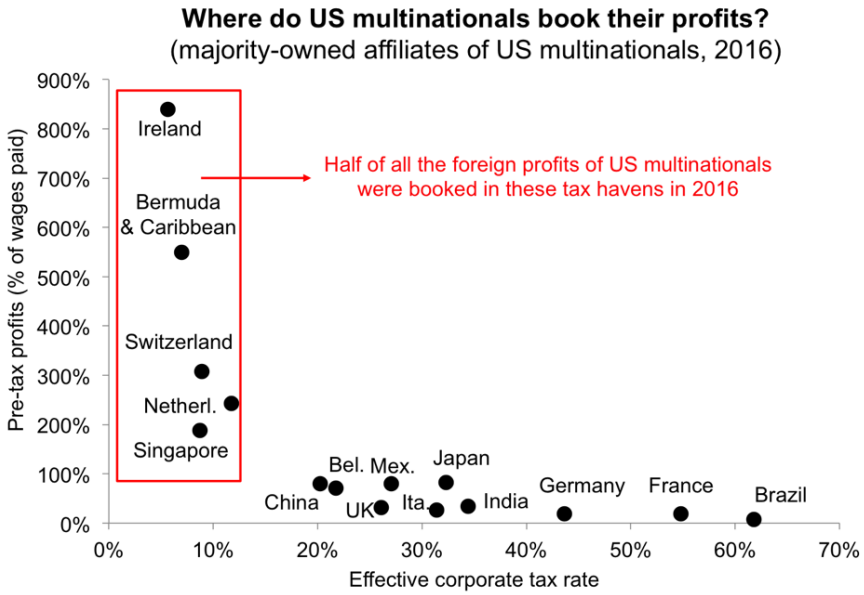
from high tax to low tax countries, reducing in this way their overall tax liability. According to the Oxford Committee for Famine Relief (2016) the 50 largest US multinational companies have allocated a part of their profits equals to USD 1600 billion in tax heavens, between 2009 and 2015. Many studies show that corporate tax rate cross-country differentials are related to the incentive to engage in profit shifting, which aims at reducing profits in high-tax countries. Haufler and Schjelderup (2000) as well as Huizinga and Laeven (2008) study international tax competition and demonstrate that profit shifting can explain a low tax rate and a broad definition of the tax base, indeed international profit shifting leads to a redistribution of corporate tax revenues across countries. First, companies can benefit from locating their activities in countries where the corporate income tax rates are low or where they are being offered substantial tax incentives. There exist different ways in order to shift their profits, such as the manipulation of transfer prices at which companies' goods and services are traded among subsidiaries of the same company located in different countries. Several studies such as Hines (1999) as well as Altshuler, Grubert and Newlon (2000) find evidence of profit shifting through transfer prices manipulation. The international subsidiaries of multinational companies frequently import products from their parent company. Indeed, subsidiaries usually act as distributors or act as intermediaries importing intermediate inputs and assembling them to create the final good. Multinational companies perform many transactions within the company and the price of those transactions is not set on an external market but is internally established. In these respect, Wachtel (2005) explains that prices can therefore be manipulated as to show high profits in low tax jurisdictions and low profits in high tax jurisdictions. Multinational companies set transfer prices for intra-firm exchanges, and in doing so they try to maximize their expected revenue by manipulating the transfer prices depending on the differences in tax rates between the home and subsidiary locations. Traditionally, headquarter activities conducted in high tax jurisdictions, such as marketing, research and development and financial services have high prices, while production activities conducted in low tax countries have low market prices. However, when multinationals trade products within their subsidiaries, they charge a lower internal price compared to the external market price for headquarter activity "exports", in order to show high profits in low taxed countries. On the contrary, they charge higher internal prices for direct production "imports" to show lower profits in high taxed countries. By pricing imports and exports as described, the multinational companies establish transfer prices that allow to conduct a profit location optimisation strategy, minimising their tax burdens.

The widespread practice of transfer prices manipulation which is leading to an erosion of global tax base has become a significant problem. Indeed, this abusive strategy is leading to a fiscal loss of large dimension. An important evidence from Álvarez-Martínez et al. (2019) shows that in the region

including the US, EU and Japan, the estimated tax loss per year is above €150 billion, showing how this phenomenon is relevant to tax authorities. Theoretically, companies should use the external market price test, the arms' length pricing, but the power of tax authorities to challenge prices is limited by high enforcement costs. When products are broadly traded at known prices, manipulation of transfer prices is quite simple to spot. Instead, the characteristics of modern intangible or electronic products instead, make transfer prices supervision by tax authorities particularly difficult, since these products are not widely traded and comparable prices do not exist. Therefore, the capacity to manipulate transfer prices is influenced by some characteristics of the companies, such as the intensity of investment in R&D. Grubert (2003) argues that companies that are R&D intensive find it easier and thus are more propense to shift profit and manipulate transfer prices. This is because the price of an intangible asset is more complicated to establish due to a lack of available data. These concerns and this strategy have therefore been amplified for digital multinational companies. In the digital economy, digital companies use transfer pricing methods to decrease their tax liabilities on their cross-border revenue, since they invest a lot in intangible assets and their principal sources of revenue come from these intangibles. These assets are challenging for the arm's length principle to apply because it can be difficult or even impossible to define the value of a similar trade of such exclusive product. Moreover, intangible assets are easily sold at low costs to companies' entities located in low-tax country since they do not need a transfer of companies' headquarters of physical plants or labour forces. For instance, a multinational parent company creating and developing a profitable intangible asset in a higher-tax country can create a subsidiary in a low-tax country and sell the ownership rights of that intangible asset to that subsidiary. The subsidiary can then collect the earnings from marketing this asset and pay low tax on these revenues. Therefore, it is arguable that transfer pricing is a strategy which has been and is still used by multinational companies. Moreover, it has been further used by digital companies and until the arm's length principle's method is not reformed, companies will continue to avoid taxation.

The following graph shows that countries with lower effective corporate tax rates, mainly tax heavens, get the higher companies' pre-tax profits. Indeed, companies locate their affiliates in low-tax countries so as to show high profits and use transfer pricing methods there to avoid taxation.

Figure 12: Tax havens[19]



b. IP location

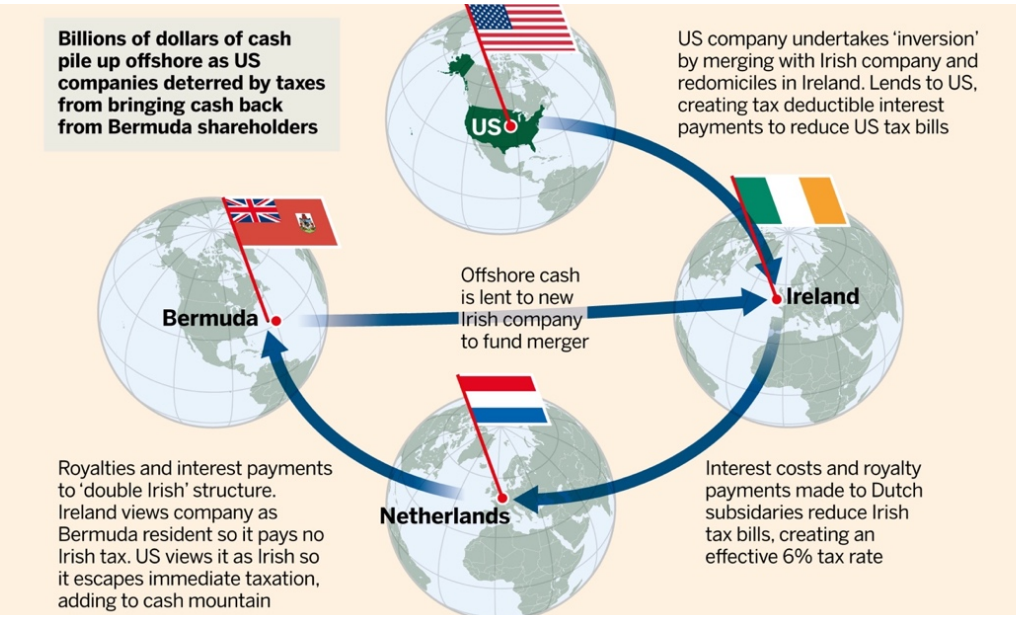
Digital companies have been increasingly adopting profit shifting manipulation which includes the use of intellectual property (IP). IP assets are fundamental to multinational companies, firstly because they are a key driver of value creation and secondly since they are easily moveable.[20] Indeed, IP assets are at the centre of international profit shifting and companies which focus a lot on IP investments and thus in particular digital companies are the most able to avoid taxes. The two main IP-based tax planning methods will be analysed, as well as the international tax treaties weaknesses that allow them. The first strategy is called Double Irish Dutch Sandwich and has been used by Google. This method is realised by multinational companies through the establishment of a group of entities, where the different entities are located in way to reduce taxation. This fiscal strategy includes the combination of two companies an IP-holding company and an operating company both incorporated in Ireland, as well as a conduit company incorporated in the Netherlands. Usually, this kind of companies' group comprises a parent company located in the United States which has a direct control on its subsidiary, the IP-holding company incorporated in the Netherlands but resident and managed in Bermuda. This IP-holding company is, for what concerns Irish tax system, considered to be resident

[19] Source: Gabriel Zucman (2018), "Taxing multinational corporations in the 21st century", Economists for Inclusive Prosperity

[20] Clemens Fuest, Christoph Spengel, Katharina Finke, Jost H. Heckemeyer, and Hannah Nusser (2013), "Profit Shifting and "Aggressive" Tax Planning by Multinational Firms: Issues and Options for Reform", ZEW

in Bermuda. Reversely, it is considered Irish from the US fiscal point of view as taxation is based on the incorporation country. First of all, the parent company will sell the IP rights to the IP-holding company. According to the arm's length principle the price of the IP rights has to be the same as the market price, however as explained above it can be very difficult to correctly price an intangible asset. Therefore, multinational companies have the power to decide the price and are able to avoid high taxes. Then, the operating company uses the IP assets and collects revenues from customers located in different parts of the world without establishing a physical presence in the country of final consumption, avoiding therefore taxation in these countries. The revenues are taxed in Ireland. However, taxation is very low since the company pays high tax-deductible royalties for the use of the IP. Moreover, the royalties' payments are made directly to the IP-holding company but first to the conduit company. By passing the royalties through the conduit company in the Netherlands, withholding taxes are avoided since royalties from Ireland to the Netherlands are tax-free. Indeed, companies active in the digital economy usually avoid these withholding taxes by establishing associated companies in countries with favourable treaties. Finally, the IP-holding company is not subject to taxation in Ireland since it is considered as a resident in Bermuda, but neither in Bermuda because there, corporations' income is not subject to taxation. Therefore, the profits collected by the multinational company from EU consumers are not taxed in the European Union.

Figure 13: Double Irish Dutch Sandwich[21]



[21] Source: Lauzon et al. (2014), "Tax avoidance", *Weebly*

However, this practice has been abandoned by companies since Ireland has changed its tax code to better deal with the international tax system, following a European Union request in 2015. Thus, companies that were currently using the double Irish practice were given a temporary period to find a new business arrangement until the end of 2020. Therefore, this specific Google tax practice has ended in 2020.

The second tax distortion technique is related to IP location. Many countries, such as Luxembourg or Belgium, in order to promote invention and to incentivise companies to perform research and development activities in their countries, use patent boxes regimes: they tax royalties at a lower corporate tax rate. However, this stimulates multinational companies to engage in tax manipulation by shifting patent location in the country with patent box without moving research activities. An example of this method is given by Amazon which structured its organization by assigning fundamental IP assets to its Luxembourg affiliates. Grubert et al. (2003) analyse US MNEs' tax return and find that the US "check-the-box" regulation encourages movement of intangible assets abroad. They find evidence of substantial movements of intangibles to low-tax-rate countries.

Chapter 2: Data: a new source of value creation

1. The digital barter: a new form of economy

This part will deal with a new form of economy based on data. Data has become the most important source of value for digital businesses. This concept questions whether the current tax system correctly takes data into account as a fundamental source of value.

a. New business models based on barter transactions

New business models are increasingly oriented toward two-sided market mechanism. Indeed, digital companies and in particular advertising digital platforms rely on the interactions and the exchanges between two sides of the market: the consumers or users on one side and the advertisers on the other side. The companies provide their services and advertising distribution for free for the consumers, while require a payment from the advertisers. Therefore, this is the traditional method used by digital advertising platforms to make profits. However, revenues from advertising are not the only source of value capturing by digital companies, more than that they also collect a massive amount of data from consumers, which represents strong new source of value. This is why these new business models can be defined as barter economy models, in which consumers do not pay with for their services with money but with other "objects": data. The new business models are therefore based on the collection, analysis and monetization of data. Much of the data collected is called transaction data, such as users' personal information, users' content posted on the platform, user's research clicks and satellite images. The data collection mechanism is necessary for digital companies to make their free products or services for consumers beneficial and sustainable in the long run. It is arguable that consumers are not only spectators in the digital platforms, in other words, they do not only look at advertising in a passive way. On the contrary they are active participants as they continuously create contents and interact with each other, providing in this way huge amount of data for the companies.

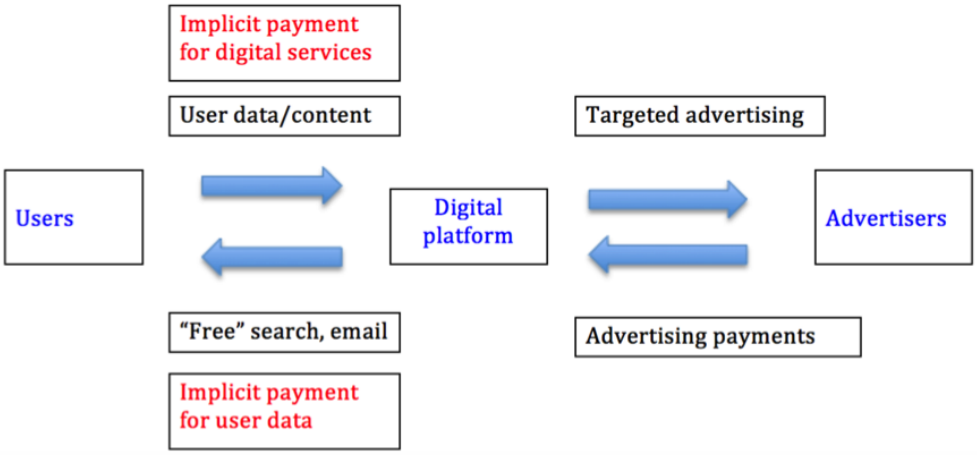
Large digital companies such as Google and Facebook rely on the free-to-consumers business model, letting advertisers pay for the services. The reliance on advertising to make profits constitutes the main source of value for digital companies. However, the main question is whether the advertising revenues are huge because of data collection, meaning that data creates a source of revenues for companies or if they are independent from data collection. Of course, the answer is that data can increase the value of advertising allowing more targeting and products personalization. Thus, user-generated data consists of a new mechanism of value creation and new opportunities and prospects

for companies. Acquisti et al. (2016) give some examples of users' data utilization: search engines rely on data from recurrent and past research to enhance search results, social networks rely on enabling advertisers to access their users' data and finally, sellers rely on past acquisitions and browsing activities to devise products suggestions for their customers. Moreover, not only advertising digital platforms are creating more value by collecting users' data, but also digital companies selling digital or physical products rely on this barter economy and can profit from users' data. Rust and Huang (2014) argue that thanks to customer data the connections between the customers and the companies are changing. Indeed, data allows companies to offer better and more personalized goods and services to customers, which in turn increase the influence of the products in the economy. Digital services, access to digital platforms or digital applications are developed at a high cost but are offered for free, meaning at zero monetary price, to consumers in exchange for the opportunity to access their data. Thus, digital firms exchange with consumers their services against the data at a zero monetary price, which represents a typical barter transaction. The World Economic Forum (2011)[22] argues that companies are investing in users' data, which are considered as valuable assets and maybe even a new form of currency. Many companies sell their products at prices below the marginal cost, often equal to zero, and make negative profits in the short term. However, in doing so the company is able to sell a large quantity of product since the price is very low accumulating in this way a large amount of data. Thanks to users' data the company will be able to enhance its future production productivity and will profit in the long term. Another possibility, which usually occurs when the services are delivered for free, is for the company to sell the data or to offer targeted advertising to other third parties. Therefore, having a price under marginal cost can be seen as an investment for future value and this makes data barter efficient.

The reliance on users' data has already been used by companies outside the digital economy. However, it is arguable that the mechanisms employed to capture those data are enhanced by the digital developments, this is why data can now be considered a very important part of digital companies' value creation. This thesis will argue that data represents a real source of profit for digital companies and this is why the data collection may require a tax payment by companies. Indeed, people increasingly use data to make transactions and companies gain value from analysing and manipulating it. Data is thus considered as a new form of money. Mayer-Schonberger and Ramge (2018) expect the prevalence of money to decrease as the data economy continues to increase.

[22] World Economic Forum (2011), "Personal Data: The Emergence of a New Asset Class"

Figure 14: Digital business model: Barter transaction with user contributions[23]



b. Data collection as a source of value

With digitalization, data collection, storage and analysis are becoming essential assets for businesses. Users are having an increasingly important role, by sharing their data with the companies. Data can be used in many different ways, for example to create new personalized products, to improve user experience by increasing targeted advertising, or simply data can be sold to third parties. Therefore, users have a clear role in value creation process. Mariani and Borghi (2019) argue that many business mechanisms and strategies that allow digital companies to gain a competitive advantage rely on users' data that can be used for the strategic value generation. Wang, Kung and Byrd (2018) explain that data captured while offering digital services can be turned into a competitive advantage and allow a better business performance.

There are various perspectives about whether users' data and shared contents create a value for the companies, depending on the kind of business activities. One the one hand, for digital platforms, users' activity and participation are necessary for the functioning of the platform, as they are the core of the business activity: the more users are active, the more other users will want to join, and the more advertisers will want to place their advertising. On the other hand, for more traditional digital business models where the sellers sell to the customers, the collection and analysis of users' data is more restricted as it is not seen as an essential feature. However, we can argue that users' data is important for products creation, personalization of delivery services or users' opinion on products that are easily shared with other users. The process of data collection encompasses every kind of data, which is actually recorded by the companies. Users can get involved in different activities, such as information

[23] Source: Tax Sage Network (2018)

searches, through search engines, financial transactions via e-commerce websites, or information diffusion through activities such as watching videos, liking a picture, writing a product review, increasing its network. Moreover, other sources of data are not generated intentionally by users such as the data collected at the moment of the inscription or at the moment of services' utilization, such as the location, the IP address, the kind of device in use etc. For example, search engines can capture every search and clicks a user makes throughout the search engine. Then they store the data and analyse it so as to find out the individuals IP addresses and collect the data also in the future. Moreover, individuals working in the online advertising industry can implement "tracking cookies" into the computers of users with whom they have had contact, in order to track the websites visited by the specific user and the activities he performed. Each data is relevant for the digital companies since it can contribute to the value creation process.

Users can participate and create more data in a more active or passive way. Passive participation does not require the users to create any content, their data are collected are gathered by the companies when users allow cookies, subscribe to the platform or download an application. In the passive participation users do not explicitly share their personal information. On the contrary, active participation requires users to publish contents or to do some activities such as bookmarking a page. There are three different ranks of participation, high, medium and low participation. Low participation involves basic activities such as tagging or rating, medium participation encompasses actions such as uploading pictures or writing products reviews, finally, high participation involves adding friends. This last activity will allow the companies to acquire more data and thus more revenues. Moreover, the more users the platform has the more it is competitive and also profitable. It is arguable that users' data is at the core of digital businesses and the main drive of value creation.

Targeted advertising

Once it has been collected, the data is analysed by the company and may be used in many different ways. First of all, data can be used to enhance advertising. Iyer, Soberman and Villas-Boas (2005) compare ordinary, non-targeted advertising with targeted advertising. In their model, they take into consideration consumers which are loyal to one specific firm. They find that when companies use a non-targeted advertising strategy, they waste a lot of resources by sending expensive communications to attract their competitors' loyal customers. While, when they use targeted advertising method, they can decide to avoid their competitors' loyal customers, and to capture their own loyal customers only. Indeed, data is used to improve targeted advertising. In this way advertising will be contextualized to the moment and targeted to specific user requirements or preferences. Because data has allowed

companies to collect the general characteristics of users, such as their interests, their location, their gender, their hobbies, or their future plans, these characteristics have become increasingly important for advertisers. They can provide higher-quality and personalised contents for the users, thus increasing their revenues. Moreover, personalized advertising is not a benefit only for advertisers but also for users, who will be more willing to use the platform as they become more interested by the advertising proposed and this will thus increase the value and the profitability of the digital company.

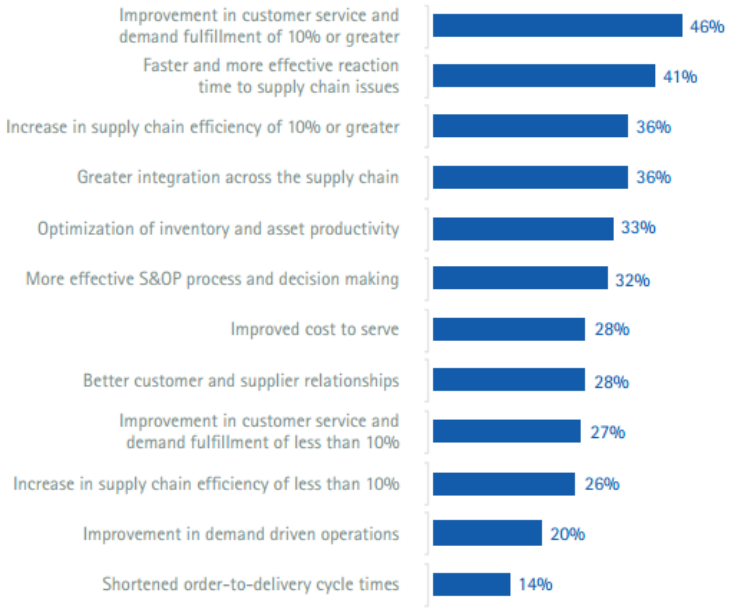
Products and services development

Another way in which data is beneficial for the companies is to use it in order to develop their core goods or services and to improve their affiliation with their customers. Users' data are an important source of value to discover users' lifestyles, customs, preferences, and interactions with the product offered by the company. This is why the data represents a relevant substitute of customers' payments of using the services. It represents a valuable product that companies can use internally and in the production. Davenport (2014) argues that users' data are therefore important to enhance customer satisfaction and experience, to optimize inventories, and identify target customer segments. E-commerce platforms can receive the level of satisfaction of their customers in real time and use this information to improve their products and also to optimize their prices.

Data trading

Finally, a last use of personal data is data trading. As data is valuable for companies, they have started selling them to third parties. A famous example of data trading is Twitter's firehose, that started selling its users' data and tweets to external parties. Precisely, Twitter allowed third parties to access, for a fee, its users' data through the API (application programming interface). Those who buy the package are given a wide access to data, which includes the last month tweets or access to tweets published since 2006. By acting this way, Twitter has made a lot of profit, which accounted for 10% of its revenues in 2015. Therefore, companies can generate large revenues, and third parties buy data in order to provide their services or to be used for research and experiments. In this business model the data is no longer an internal product of the companies but represents a revenue-generating asset. Therefore, this thesis argues that data is an increasingly important value for digital companies, as it can create large revenues. It can be used to enhance advertising, to improve services, or can be directly converted into revenues. The following graph shows how data are used by companies to increase their productivity.

Figure 15: Companies' services improvement thanks to data[24]



2. Introducing a tax on data collection

Having examined the importance of data for digital companies, it seems necessary to include them in the taxation model.

a. Tax challenges raised by data collection

By comparing traditional value creation model with digital one, we will see that the current tax system is not correctly designed for the digital economy. In a traditional value creation model, a multinational company produces goods in a country X, it creates value in this country and is therefore taxed there. Then it sells the goods to a subsidiary with a permanent establishment in country Y, which carries out advertising and distribution activities and sells the goods to customers in country Y, creating value and being taxed on the profit it makes from sale. On the other hand, in a digital value creation business model a company located in country X develops a digital product, such as a digital platform. Then the company sells advertisement space to an advertiser located in country Y, which allows the advertiser to personalise ads to users located in country Z. Users in country Z can have access to the platform in exchange of their personal data. The company creates value in country X and is therefore taxed there on all profit it earns. However, the company creates value from using the data of country Z's users to sell advertising space to advertiser. The question is whether value is created in Z where

[24] Source: Research Data Alliance, "Big Data - Definition, Importance, Examples & Tools"

data are collected, in Y where the tax-deductible payment is realised or in X where the company is actually located.

Data and user participation are part of the main characteristics of digital business models, however there is a debate between the members of the OECD on whether they represent a real contribution to value creation. For some countries the role of data is a fundamental component of value creation, companies increase users' engagement in order to collect larger amounts of data, they monitor users' activities and choices to create new personalized contents and benefit from this. Moreover, users' participation is also crucial for the reputation of digital companies and it is necessary for network effects, indeed, the more contents users share the more attractive the companies are for other users. Some countries believe that data collection and user participation in general are transactions between the users, who provide data, and the companies, which provide services in exchange for these data. These countries agree with the fact that interactions between users and digital business is a transaction that could be subject to taxation; however, they do not agree with the fact that the action by the digital firm of collecting data from users is an action to which profit should be attributed only because the data acquired may be valuable. Finally, other countries do not perceive the delivery of personal data or the interactions between users and companies as barter transactions. There are many views that argue that consumers provide their data in a voluntary way in exchange to the access to services, thus this data should not be taxed. However, other views explain that many times users don't have the choice to avoid sharing their data. Therefore, the data collection taxation is a complicated situation where there is no consensus among countries.

Giant IT companies are increasingly dominant in the economy. The OECD evaluates that these large companies annually avoid USD 100 billion to 240 billion in taxes, which corresponds to 4% to 10% of global corporate tax revenues. This situation occurs since as explained in the first chapter, digital companies avoid having a permanent establishment in the countries where they create value. They can thus access a very large market without having a physical presence in the countries, avoiding taxation in the customers countries. These countries suffered from not collecting taxes from services offered in own states, to their citizens. Moreover, the possibility to easily transfer their intangible assets in low-tax countries allow these companies to pay even less taxes. Hence, this phenomenon is thus creating some troubles in advanced countries, in particular in Europe, as well as in emerging and developing countries, which are not collecting enough tax revenues. Additionally, large digital companies are paying much less than companies relying on traditional business models. The

European Commission[25] estimates that digital companies are subject to a tax rate of 9.5% while traditional companies bear a tax rate of 23.2%. Therefore, taxation in the digital economy constitutes a real challenge.

Taxation rights are usually aligned with value creation location. Value is defined as a value subjectively attached to a good or a service by a consumer. We can consider as the value of a good its market price, as it is the average of individuals' value opinion. Therefore, the development of value creation consists of the economic activities which are conducted to add value to a product, increasing its price, leading to higher revenues. Moreover, the Rosting (1923) argues that the concept of value creation is connected to the production of wealth. Thus, the taxes should be collected in the places where value is created and according to the intensity of value creation. As argued in the previous sections, users' activity and their personal data are fundamental components of digital business models, and companies create large profits from data collection and users' generated content. Data collection constitutes an important source of the value creation for digital companies, which should therefore be taxed, in part, in the countries of location of the users. The problem of taxation occurs because of the deviation between the location of value creation and the nexus. Indeed, users' personal data are usually collected in a location in which the companies do not create a physical nexus, and the services provided are based on the data, which lead to additional profits for the company. In order to establish taxing rights in the country of users, it would be necessary to establish a causal relationship between the data collection and the economic activity of the company. The economic activity occurs if the company offers a product or service that result from the data collection, meaning that data should represent a value for the company, for cost savings or revenue creation. For example, a large network of users, which continuously provide new contents and share their data is considered an important contribution to the value creation of a digital platform, independently from the intangible assets which are used to analyse this data. However, this value creation is currently not included in the international tax framework. Thus, this can raise challenges to the existing taxation rules when the digital companies collect data from users in countries where they do not have a physical presence. Conclusively, this raises concerns of how to measure and how to attribute the value created from the collection of users' data.

[25] EU Commission (2018), "Questions and Answers on a Fair and Efficient Tax System in the EU for the Digital Single Market"

b. Possible tax reforms

Nowadays, the current frameworks of international tax system are not aligned with the digitalization phenomenon. As explained in the first chapter, new digital business models can avoid taxation by benefiting from the flaws in the international tax treaties. Thanks to digitalization, multinational companies can internationalise all their business aspects, by locating their components: activities, customers and parent company in different countries around the world. Therefore, it has become increasingly difficult to identify the location of a particular activity, as the creation of value can be performed in various countries. Thus, the challenge is to allocate taxable profits across all countries involved and to understand the new components of profits. As we have explained, many digital companies provide their services to their users for free. Instead, they create revenues through advertising services and use personal users' data as well as users' published content to improve these advertising revenues and enhance the value of the offered services. The first question that arises is how to allocate the profits across the countries in which companies operate. By taking the specific example of a digital platform, it is argued that there is a barter transaction, in which the users have access to the platform without paying a monetary value for it, but in being active in the platform they diffuse information and data that are valuable for the company in selling advertisements. However, the advertising contracts may be located in countries that are different from users' countries. According to the current treaties, the rights to tax corporate income are allocated to the country where the advertiser has its residence if the multinational company has a permanent establishment in that country. Nevertheless, advertising sales is fundamentally a digital process. Thus, the companies do not necessarily need to have a permanent establishment, and the income is usually taxed in the shareholders residence country. Moreover, the users provide data to the company, which is a necessary part of the value creation. Thus, profit arising from this data should be taxed in the country of residence of the users. However, under the current permanent establishment rules, the company will not be subject to taxation if it does not have a physical presence there. If we assume that the company can be taxed in the users' country, then the company will receive data from users but will also have to pay the costs for collecting this data and as long as the two are equal the company will not pay taxes on income in the country. Therefore, it is essential to determine the value assigned to data collection to understand how profit can be allocated across jurisdictions. If the value of data is greater than the cost of services provision, then the digital firm makes a profit in the country of users' location. This gives this specific country the possibility to tax the barter transaction, that is the data collected, and to gather part of the income of the company.

The issue of the barter transaction could come up under other taxes as well. The country of the user could consider the barter transaction as a service acquisition and this purchase could be subject to the Value Added Tax. Recently, it has been asked by the German authorities and the European VAT Committee whether the supply of digital services without a monetary consideration in exchange for data is a transaction that should be subject to the Value Added Tax (VAT). A discussion centered around the use of data as a currency has become central in the digital economy. As previously seen, many digital companies and in particular digital platforms and search engines, provide their services for free, but ask in exchange for the use of users' data. Thus, the valuable data collected can be considered as the payment for the use of the digital services. From a VAT consideration, the transaction would be regarded as a barter. Taxing the barter transactions of digital platforms would raise the country's revenue and allow more competition with domestic and non-digital companies. The article Article2(1)(c) of the VAT Directive institutes that the supply of services for consideration within the territory of a Member State by a taxable person acting as such, shall be subject to VAT. Thus, in order to determine whether the users' personal data received by the digital service provider is subject to VAT, it will be necessary for this transaction to satisfy the conditions for VAT application. In other words, it has to be established whether the supplier is a taxable person and whether the services are offered for consideration. Data is considered as intangible property of the private individuals. The data collected from the users serves the companies economic and commercial purposes and the companies are willing to accept them instead of a monetary payment. Thus, the barter transaction occurring between the providers of digital services and the users constitutes a consideration. The EU Commission[26] states that data collected has an economic value. However, for the VAT to apply, there should be a legal relationship between the provider and the user, where the data represents the actual value given in exchange for the services. In this respect, digital companies offer their services independently from users' data quality and quantity and do not expect consumers to continuously provide other data. Therefore, because of the absence of relationship between the services offered and the data received in exchange, the EU Commission argues that the provision of digital service without a monetary consideration, but in exchange of data, does not constitute a taxable transaction. Moreover, today, even if personal data can be considered as consideration, every online resource involves a constant flow of data. Indeed, every digital company collects its users' data, that they will later on analysed. Thus, the compulsory link between the supply and the personal data provided is difficult to be recognized. Nevertheless, the EU Commission[27] adds that if there exists a

[26] VAT Committee (2018), "Question Concerning the Application of EU VAT Provisions"
[27] i.d.

sufficient relationship between the services and the data, then there should be a transaction subject to VAT, where the taxable amount would be equal to the cost of services provision to the user.

This new digital economy based on data has completely revolutionized the concepts of source, ownership and value for tax policy design. A single data has no monetary value in per-se; however, a huge amount of data collected and analysed together has a value. Thus, data collectors are interested in every single data in order to put them together and create value. If we want to impose a tax on the barter transaction, we should accept that even a few or a single data, which is asked to users at the moment of the services' utilization, such as the inscription to the platform, or the download of an app, has a value. However, this is not the case. Therefore, taxing data collection under VAT is a complex issue and this thesis will propose to tax it at the level of corporate income. Indeed, companies collect huge amount of data, which together have a value. A single data from one user is irrelevant for companies, in fact, from this data it is impossible to determine overall market preferences, needs and ideas. On the contrary, many individual data put and analysed together can give information about the market, can be used to observe trends and to provide products or services personalized to broader categories of users. Moreover, a single data concerning a user cannot reveal his or her personality and tastes. While a large amount of data collected from the same user can give companies a high knowledge of him or her and can allow them to increase user experience's personalization. In order to determine corporate income tax, the current tax framework focus on the residence and source country of income. For what concern the data ownership, the same reasoning applies: owning personal data does not create any value for a single individual, while owning the same personal data of that individual plus the data of other individuals creates a value for the digital company. Finally, following the same logic, the source of data is not the users' place of residence, since as we already explained a single data has no value, on the contrary the source should be the place where data are collected and analysed. However, determining this place is impossible since data is collected by machines and thus not collected in a single place. It is arguable that the source and residence concepts are no longer useful methods to determine income creation.

The theoretical view is that data represents a source of value and has a monetary value. Indeed, the collection of data can be considered as a source of income received by the companies and should thus be subject to taxation. A proposal could be to tax data in the corporate income tax based on the monetary value of this data. In other words, the tax should not be different from one unit of data from another but should increase with the number of data collected. Moreover, the tax will increase with the use of the data by the company, since the utilization of data allows the company to generate more

income from enhancing its services or targeting advertisement. Furthermore, data will be taxed both when collected and when used. However, it is important to consider that data will be taxed only if collected in large quantities. Meaning that a small firm collecting some data from its users will not be taxed. This concept should be applied mostly to large digital companies that continually collect data and use them to create income and for which data is the central part of their business models. The question of how to tax data will be later addressed in Chapter 3.

3. Other issues raised by data collection

As we propose to tax digital companies for data collection, since they represent a source of value, it may be worth analysing whether this taxation could be beneficial to address other issues caused by intensive data collection.

a. New business models support disinformation

The data economy presents further challenges for individuals and societies, that might be addressed and reduced if data collection was taxed. Data is essential for digital business models. The more users' activity, the more data generated, which in turn increases potential profits for the companies. Therefore, without users' activity and data generation, the model falls apart. However, since companies earn more from their users' activity and data, they have an incentive to maintain the users connected to their platforms for as long as possible. Apart from targeted advertising, another way to attract users is the spread of fake news, which in turn will lead to disinformation. Vosoughi et al. (2018) find that false news stories spread more rapidly on Twitter's social network than real news stories do, indeed, fake news are 70% more likely to be shared than true news are. Additionally, Solomon (2016) shows that Facebook uses certain methods, including fake news diffusion, to keep users connected on its platform. The European Commission defines disinformation as "verifiably false or misleading information created, presented and disseminated for economic gain or to intentionally deceive the public". Moreover, Brody and Meier (2018) define fake news as information that is inconsistent with accurate reality. Disinformation can lead to severe consequences, causing social harm, threatening politics, affecting people's security and health. It can finally manipulate and change people opinion and thinking. Disinformation and fake news have existed long before the digital age; however, we can say that the spread of fake news has increased a lot with the advent of social networks and digital platforms, constituting today a real challenge for the authorities. Indeed, the current business models applied by social media networks and digital platforms are acting in

favour of fake news dissemination. Digital companies benefit from maintaining their users connected for as long as possible. Therefore, they benefit from the spread of fake news, which in turn attracts users and leads them to make further research or activities on the platform. Therefore, this will increase the data that could be collected by the digital company. The main issue is that if users read a fake news, then digital algorithms will continue to propose them large quantity of fake news. This can be dangerous for users and for society as a whole. Recently, digital companies have agreed on a voluntary basis for a set of international self-regulatory standards to reduce disinformation, called The Code of Practice on Disinformation. This Code was subscribed by digital platforms, social networks and advertisers, namely, Facebook, Google, Twitter and Microsoft. The main goals of the Code consist in disrupting advertising revenues of accounts or websites that spread disinformation, making political advertising more transparent, eliminating fake accounts, enhancing users' capacity to report disinformation, authorizing the research community to supervise disinformation through access to the platforms' data. Moreover, the European Union has proposed an Action Plan[28] to increase efforts to counter disinformation in Europe. The objective of this proposal is to improve detection, analysis and disclosure of disinformation, enhance collaboration to threats, increase cooperation with digital platforms and advertising industry to detect and eliminate disinformation, and finally, increase awareness and resilience. It is arguable, that taxing digital companies for data, will lead them to decrease their collection of data, which in turn, will reduce the need to spread fake news to maintain users active.

b. Taxing data collection to address social issues

Users' privacy

Data economy raised other important challenges. First of all, a privacy issue. Companies that collect data have access to any private information and could use them in every way they want. Thus, individuals and societies may suffer from bad use of data, such as identity theft. However, revealing information is also beneficial for consumers, since it allows more personalized services and products and targeted advertising. There is thus, an important trade-off arising from the decision of whether protecting or sharing personal data. Some literature proves that privacy protection can decrease economy's well-being, while other papers demonstrate the contrary. The main issue, however, is that fact that users are often not aware that their information has been collected. Users are usually not given a choice to decide which type of information to reveal. Additionally, services are offered on a

[28] EU Commission (2018), "Action Plan against Disinformation"

take it or leave it basis, meaning that without the sharing of personal data the users cannot have access to the services, which are sometimes necessary for them. Individuals are therefore obliged to share their data and to lose their privacy. By taxing data collection, many data collectors will be disincentivized from doing so.

Monopolies

Another challenge raised by digital companies' new business models is the fact that data creates monopolies. As we have explained in Chapter 1, digital business models rely on the network effect, the more users they have the more other users will join. Thus, companies can easily gain a dominant position in the market by increasingly collecting data and increasingly improve their services thanks to this data, which in turn increases the number of users. This phenomenon can hurt competition, making it impossible for small start-ups to enter the market. Therefore, increasing corporate income tax for large digital companies could maybe give more opportunity to small firms to compete. Clearly, tax law cannot be used to address competition issues. However, monopolistic digital companies are using tax system fallacies to their advantage to reduce their taxation and increase their personal profits, at the expense of smaller firms and, in particular, non-digital firms. Thus, we think that reforming tax system and imposing a fair taxation on digital companies could possibly have a positive impact on competition.

Environmental issues

Furthermore, there also are environmental concerns. James Glanz (2012)[29] explains that the storage of data requires large data centers and warehouses to host the servers. These data centers consume large amounts of energy in a wasteful manner. Digital companies usually run their facilities at their maximum capacity for 24 hours a day in order to meet their consumers demand, regardless of the actual demand. As a result, data centers waste more than 90% of the electricity they pull. In total, these data centers power consumption is equivalent to 30 nuclear power plants. Moreover, as data collection continues to increase, more space and power will be needed to store and process it, leading to environmental damages. Taxing data will decrease data collection and could be a solution for reducing these environmental concerns.

[29] James Glanz, *Power, Pollution and the Internet*, N.Y. TIMES, Sept. 22, 2012

Users' manipulation

Finally, a last challenge is linked to data mining, which can be used to influence individuals. A specific type of information can be sent to consumers only to influence and manipulate them. This activity is possible because of data collection, interest groups can target specific individuals and try to manipulate their way of thinking. This issue is connected to politics; indeed, data collectors can influence political elections. Big digital companies such as Facebook have a huge power in politics, with the ability to persuade and influence people by microtargeting. Therefore, taxing data collection will decrease the ability to target information, reducing the ability to control and manipulate individuals.

Chapter 3: Addressing digital companies tax challenges

1. International and European Union initiatives and other proposals

In this section, some solutions to the tax challenges will be illustrated. Specifically, the OECD proposal, the European Union solutions and the Destination Based Cash Flow tax will be presented.

a. OECD actions and BEPS project

The phenomenon of digitalization has challenged the concepts of the international tax systems, in particular the notions of permanent establishment and the arm's length principle. Nowadays, the international tax system is not able to correctly tax digital multinational companies, which can easily avoid their tax burdens. The tax challenge linked to the digitalization of the economy has led numerous national and international authorities to act. This challenge has become a priority, and the necessity to restore the stability of the international tax framework has become urgent in order to avoid any risk of uncoordinated responses from individual countries. The OECD Model Convention says that multinational companies should pay their taxes in the country of residence or in the source country if they have a permanent establishment there. However, digital companies can evade taxation in both countries, thanks to the digitalization and the increase of intangible assets. Indeed, they can operate in every country without having a permanent establishment and without being liable to taxes. Moreover, since these companies are digital it is easy to locate their residence in a low-tax country. Thus, the digital companies are not paying their fair share of taxes.

The OECD action to address the challenges of the taxation of digital companies has started with the introduction of the Base Erosion and Profit Shifting (BEPS) project. This project is mainly based on the reduction of tax planning in order to limit or even avoid the tax strategies created by multinational companies to erode the tax base of one jurisdiction in favour of other jurisdictions. It consists of 15 actions, each dealing with a particular issue of current international taxation. As we have explained in Chapter 1, these strategies have usually been put in place by taking advantage of the difference in tax rates, transferring profits from high-tax countries to low-tax countries. In 2013, the OECD has elaborated the Action Plan on Base Erosion and Profit Shifting, which presents the fundamental measures to implement to limit base erosion and profit shifting practices. The first Action is entirely dedicated to the digital economy taxation and is called "Tax Challenges arising from Digitalisation". This Action explains that economy digitalization has increased the international tax system's weaknesses, since it has increased the reliance on intangible and has reduced the need for physical

presence, thus implying tax reforms. Moreover, other actions are relevant for the taxation of digital companies, in particular, Action 3 "Controlled Foreign Company", Action 5 "Harmful Tax Practices", Action 7 "Permanent Establishment Status" and Actions 8 to 10 about transfer pricing. The main challenges and concerns raised by the OECD are firstly, the fact that companies are now able to have a significant economic presence in a country without having a physical presence, hence, without being liable to taxation. Secondly, the value created by the collection of data. Thirdly, the characterisation of revenues coming from new business models. Lastly, another challenge is linked to the VAT collection from the sale of digital goods and services across borders. This thesis will not be discussing this last challenge since it will only concentrate on the corporate income taxation.

The OECD has proposed three main solutions. First of all, the introduction of digital permanent establishment or significant economic presence. Then, the introduction of a withholding tax on digital transactions. Finally, the creation of an equalization levy. As we have seen in chapter 1, today the concept of permanent establishment requires a physical presence in a country, which the OECD could be willing to modify since it constitutes a rule linked to the old business models and since it is inconsistent with the digitalization. The proposal is to introduce a significant economic presence of a foreign company in a country. According to this proposal, it would be possible for a country different from the residence country to impose a tax on a foreign company. In order to determine the significant economic presence, the OECD has proposed some indicators such as the revenues, the number of users and the number of operations. However, this proposal presents some inconvenient in addition to the determination of the factors to define the significant presence, which are the determination of revenue attributable to the country where the company has a digital permanent establishment, as well as problems linked to the reform and modification of all the international treaties. With respect to the third proposal regarding the introduction of an equalization levy, it mainly consists in a tax on digital transactions carried out by a foreign company, specifically on the data that it collects on resident users.

In 2018, the OECD has presented an interim report on the taxation of the digital economy "Tax Challenges Arising from Digitalisation – Interim Report 2018", which presented the main business models used by digital companies and tried to conciliate them with taxation recognizing the need for a worldwide solution. The main problem, as we have explained in the previous Chapter, lies in the individualization of the place where value is created. OECD members have questioned whether the place of taxation should be the country where the products or services are offered or the country where the value is created. Today, under the tax frameworks, the division of taxable profits among

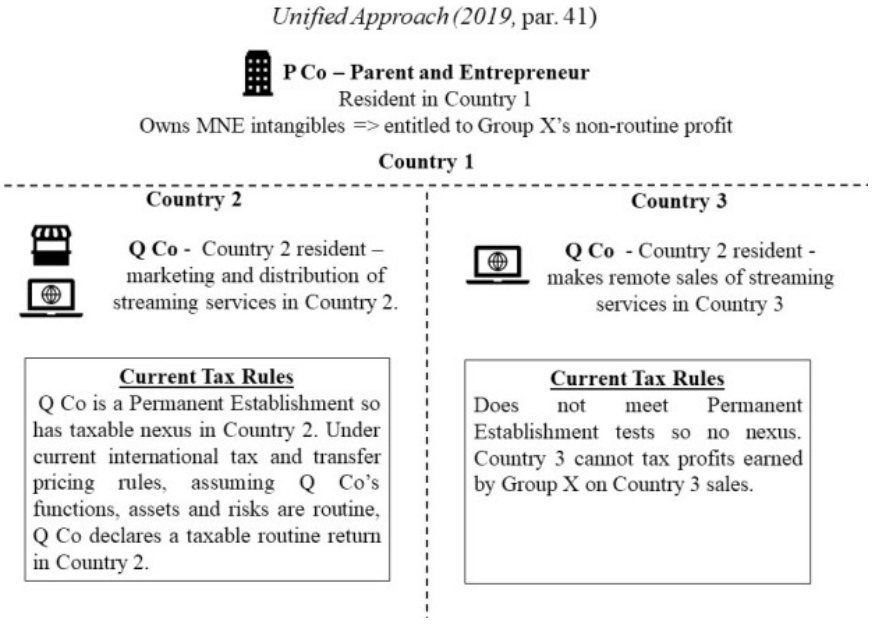
the countries does not include the countries of sale. Thus, the reform will have to include a change in the present norms to redesign the division of taxable profits. Moreover, the digital companies and in particular the digital platforms, create value from collecting, analysing and using their users' data, to transform them in commercial information which is used to produce more personalized products or targeted advertising. This could justify a taxation in the country where users are located, but the OECD questioned how to measure the value of this data.

In 2019, the OECD Inclusive Framework members have presented a global solution based on a two-pillar approach: Pillar One and Pillar Two. The former is based on new nexus and rules about profit allocation across countries, the latter is focused on a global minimum tax. In October 2020, the OECD has released a Cover Statement and the Reports on the Blueprints of Pillar One and Pillar Two. Today, the conditions for an agreement between countries have not yet been reached, but 137 members of the OECD agreed to use the Blueprints as a basis for future agreements on income taxation. We will now analyse the Pillar One Blueprint. Pillar One expands the taxing rights of jurisdictions, in which a foreign company makes an active and sustained participation in the economy, to tax this foreign company. In particular, for some business models the taxation will occur in the users' residence. The three elements of Pillar One are: a) a new taxing right for countries over a share of residual profit of a multinational company, which is referred to as Amount A; b) a fixed return for some marketing and distribution activities taking place physically in a country, referred to as Amount B; finally, c) procedures to enhance tax certainty through dispute prevention and resolution processes. Amount A tax base is applied to multinational companies that implement in-scope activities, which englobe: Automated Digital Services ("ADS"), in other words services made available to users through digital means, and Consumer Facing Businesses ("CFB"), which are traditional businesses that use digitalisation to participate in an active and sustained way in the economic life of a foreign market through the use of consumer-facing intangibles and without necessarily investing in local infrastructure and operations. The main characteristics of Amount A include, firstly a revenue threshold based on multinational companies' annual revenue together with a minimum level of foreign revenue. These thresholds are applied in order to reduce compliance costs. Secondly, a scope rule, which requires the businesses to have significant and sustained interactions with users in a market jurisdiction. Moreover, the profits will be allocated to the countries following a formula based on consolidated financial accounts. Specifically, multinational companies will calculate their Amount A profit based on their consolidated financial accounts, but only the share of that profit measured by a formula corresponding to in-scope revenue will be allocated to countries. The Amount A taxing right would require reforms of national laws as well as a multilateral convention. On the other hand,

Amount B has the scope to increase tax certainty and decrease controversy between tax administrations and taxpayers. It would normalize the remuneration of distributors that perform baseline marketing and distribution activities in the jurisdiction, to approximate the results determined in accordance with the arms' length principle. In other words, the Amount B would represent a new and more simple form of arms' length principle. Pillar One will thus require the formulation of new rules to determine the source countries to which taxing rights will be allocated.

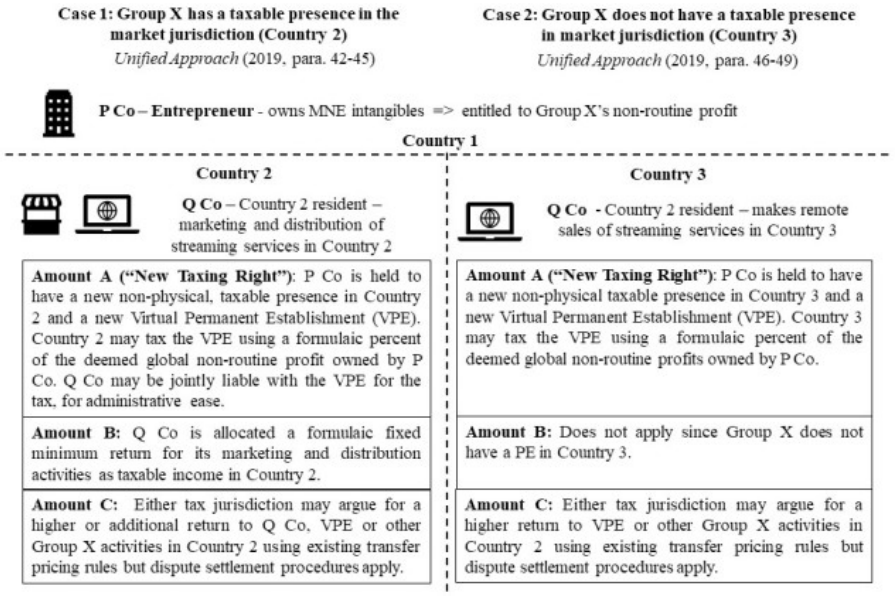
To better explain this concept, we will make two examples. First, let's consider a multinational company that has a permanent establishment in a country where it distributes online services. Thus, the company has a taxable presence in this country. With respect to Amount A, the company is considered to have a non-physical, taxable presence in the country and a virtual permanent establishment. The country can tax the profit based on a formula approach. With respect to Amount B, the subsidiary company receives a minimum return for its distribution activities, which is taxed in its country. If we consider now a multinational company with no taxable presence in the country where it distributes online services, the Amount A rule will also apply, giving the opportunity to the country to tax the company. While the Amount B rule will not apply, as the company does not have a permanent establishment.

Figure 16: Facts and Circumstances of Group X[30]



[30] Source: Eden L., Treidler O., (2019), "INSIGHT: Taxing the Digital Economy—Pillar One Is Not BEPS 2 (Part I)", *Bloomberg Tax*

Figure 17: Pillar One Proposals for Group X[31]



We will now describe Pillar Two Blueprint. Pillar Two main goal is to ensure that all multinational businesses pay a minimum level of tax, reducing the power of digital companies to intentionally shift their profits. The main mechanism to achieve this result is the income inclusion rule (IIR) as well as the undertaxed payments rule (UTPR), as a secondary rule if IIR is not applicable. The IIR will cause additional tax payable in the country of the multinational's parent company, when the profits of the multinational company in any other country are taxed at an effective tax rate below a minimum tax rate. The UTPR will act as a backstop for companies subject to low taxation, which are not managed by a parent company subject to IIR. These two rules only apply to companies that have or exceed a €750 million annual gross revenue threshold and will only require the reform of national laws. Becker and Englisch (2019) argue that an international minimum tax could have a positive effect on the efficiency and fairness of the international tax system. However, the main difficulty will be to set the minimum rate. Moreover, the IIR should be constructed as a minimum tax, where the overall tax burden is equal to the effective minimum rate. The effective tax rate of the subsidiary should be measured based on international accounting standards. Similarly, the UTPR should be constructed as a minimum tax, so that the final tax burden is equal to the minimum rate. The two rules should be coordinated to avoid double minimum taxation, and the IIR should be the prevalent rule. We can argue that the rule of minimum tax can be a good temporary solution, but it does not really take into

[31] Source: Eden L., Treidler O., (2019), "INSIGHT: Taxing the Digital Economy—Pillar One Is Not BEPS 2 (Part I)", *Bloomberg Tax*

consideration the role of users' data as value generator. Thus, if the tax system will decide to allocate taxing rights in the users' countries, the scope of the minimum tax will diminish. The proposal of the OECD constitutes the most important development for international taxation in the digital economy. However, it focuses on the source and residence concepts, which can be difficult to establish in the digital economy. In particular because of the importance of data. Furthermore, it will require a high level of international coordination. Moreover, many issues have still to be decided, such as the components of the residual profit formula or what thresholds will be established.

b. EU institutions views and propositions

The European Union (EU) members have started to make decisions on their autonomous digital economy's taxation. To avoid European market distortions and fragmentation of the single market, the EU has decided to intervene on this issue and has proposed its own solution. The EU has recognized that the international fiscal system, which has been created for old business models, characterized by physical presence of companies, is incompatible with the fast economy's digital transformation. The weaknesses of the tax system have led to differences between digital and traditional companies, in favour of digital ones. The main taxation goals the EU wants to achieve are a) equity, achieved by taxing profits in the value creation location, b) competition, by avoiding tax barriers, integrity, by defining a common solution for the member states, and c) sustainability, by creating a fiscal system in line with digitalization developments. For the taxation in the place of value creation, it would be necessary to determine what constitutes value in a digital economy, how to measure it and where it has been created.

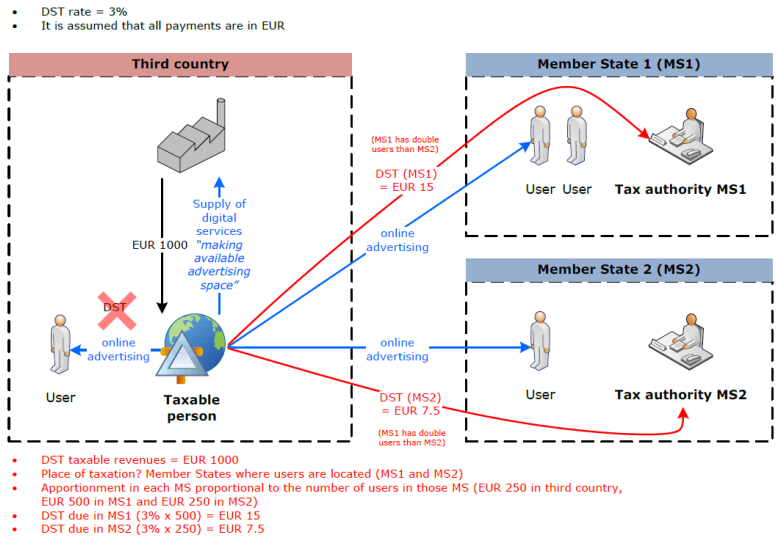
In 2018, the EU Commission has proposed some regulations for the digital economy's taxation issues, which included three main proposals. First of all, the concept of virtual permanent establishment, which would allow jurisdictions to tax foreign companies based on significant digital presence. Secondly, the Digital Services Tax, being a European tax on digital services. Finally, a recommendation to the member states to reform bilateral treaties with third countries to include the concept of virtual permanent establishment. With respect to the virtual permanent establishment solution the Commission explained that is a long-term solution. This solution will need to revise the international tax framework to adapt profit taxes on digital companies. In order to be subject to taxation under a virtual permanent establishment companies have to meet some requirements. Firstly, companies have to offer digital services through a digital platform. Then, businesses have to be taxed if their annual revenue exceeds €7 million or if they have over 100 000 users in a member state or more than 3000 commercial contracts for digital services. The EU gives large importance to the role

of users in the creation of value. This is why one requirement for taxation are the users, which, indeed, share their data and create valuable content. The determination of elements for the profit allocation among countries is based on the OECD proposal, which also includes R&D expenses, the number of users and data collection.

The Commission also proposed the introduction of a withholding tax on digital transactions and a digital equalisation levy as short-term solution. The so-called Digital Services Tax is compatible with the current tax framework. Taxes would apply only to enterprises with total annual revenues exceeding €750 million, and total annual EU revenues above €50 million. The Commission advised a tax rate equals to 3%, on digital services for which user's data are essential as a source of value creation. Tax revenues would be allocated to each member state equitably with respect to the number of users. Withholding tax is relatively easy to administer; however, it is expected that many digital companies will simply shift such taxes to consumers through increased pricing. Thus, these kinds of measures are not long-term solutions: they react to an immediate abuse of the current tax rules and ensure that taxes on sales by digital multinational companies to local customers are collected by each country. They will be replaced by the digital permanent establishment rule when this one will be completed. However, some EU member states were supportive, while others claimed that digital companies do not require special policies. Indeed, the proposal has not been implemented at EU level, only some member states have taken unilateral actions that reflect the value of users for platforms. The Directive proposal states that the services which are subject to taxation are the advertising services, the transmission of users' data, the provision of platforms for the exchange of goods and services. In order to determine the tax base, it would be needed to calculate the number of times the advertisements appear in the country, the number of users who share their data and the number of users who engage in buying or selling activities through a disposal located in the country. Moreover, the EU has decided to focus on the Common Consolidated Corporate Tax Base (CCCTB) for the allocation of taxable profits among jurisdiction, since this will allow a fair and efficient repartition.

The Digital Services Tax relates many different parties that may be situated in different countries: the national tax authorities, the digital companies, which are the taxpayers, the customers, who acquire digital services and the users, who represent the source of value and the location for tax revenue allocation across EU countries.

Figure 18: Digital Service Tax[32]



The figure above represents a digital company located in a third country, which sells digital services for 1000 euros to a customer situated in the same country. The services acquired are employed by the customer to target users both in the third country and in the EU member states. The Digital Services Tax should be paid in the location of users, that is in the member states, according to the number of users. Therefore, this proposal considers two territorial allocations, the digital services' country of sale and the country of users' residence.

Both short-term and long-term solutions present some weaknesses and unsolved questions. The long-term reforms will require the modification of international treaties and bilateral conventions. Moreover, they will require a criterion for identification of significant digital presence to be determined. While the short-term solution will also require the identification of the States with taxing rights as well as the allocation of taxable revenue among them. In addition, the Digital Services Tax will be applied to revenues without taking into account costs deduction, which could increase disparities between companies. Indeed, revenues alone do not represent the financial situation of a company, and two companies with the same revenue can actually have two very different profits or losses. Taxes on revenues, differently from taxes on profits, are regressive and can harm companies. Moreover, the Digital Services Tax will possibly lead digital companies to increase the fees paid by their European users. Another critique raised against this tax, is that it is not efficient to reduce international tax avoidance and profit shifting methods. This is because digital firms are not the only that rely on intangible assets, so the tax arbitrarily targets companies in the digital economy. On the

[32] Source: European Commission (2018)

other hand, Cui (2019) proposes arguments in defense of the Digital Services Tax over the long-term solution. Firstly, he argues that digital firms have very low marginal costs, thus, marginal revenue is essentially the same as marginal profit. Secondly, a tax on location specific rent will require less coordination through tax treaties. Finally, he states that it is unclear that coordination based on treaty would increase tax efficiency. Many Digital Services Taxes have been adopted in European countries, but the EU Commission has proposed an EU DST directive, which for now still constitute a temporary solution until the creation of a significant digital presence. With respect to data, Digital Services Tax is based on the value imposed on sale, which does not necessarily bear information about value of data collection.

c. The Destination Based Cash Flow Tax

The challenge today is to find alternative ways of taxing new business models. According to many, it is possibly no longer enough to reform the current tax systems; re-creating them could be necessary. A possible solution proposed by the Meade Committee (1978)[33] is the Cash Flow Tax. This would require tax administrations to directly tax the cash-flow in order to limit companies from instrumentally allocating their profits to low-tax jurisdictions. A cash flow tax applies to net receipts, differently from ordinary tax capital assets are immediately expensed and not depreciated over time. Every cash inflow will be taxed, while every cash outflow will be subtracted when measuring the tax base. It would be beneficial since cash flows are easier to track and harder to manipulate than earnings. It is worth underlining that the tax base of the Cash Flow Tax would be based on the same factors used for the formulary apportionment of the European CCCTB.

Recently, Auerbach, Devereux, Keen and Vella (2017) argue that income has to be taxed in the consumers' location, because it is less expected to be manipulated and to produce tax distortions in the production's location. They proposed a destination-based cash-flow tax (DBCFT) formulary apportionment based on goods and services sales, as a substitute solution for the current corporate income taxes. A DBCFT would be based on sales minus expenses incurred in the country. However, the DBCFT would tax inflows and outflows differently; indeed, income from sales is subject to tax in the country of the sale, the destination country, while expenses, receive tax relief in the country where they are realised, the origin country. We will give a simple example of the destination-based

[33] Institute for Fiscal Studies (Great Britain), Meade J. E., (1978), *The Structure and Reform of Direct Taxation: Report of a Committee [set Up By] the Institute for Fiscal Studies [and] Chaired by JE Meade*, Allen and Unwin [for] the Institute for Fiscal Studies.

cash flow tax: assume a company produces goods in country X and spends 50 in this country, then it sells goods domestically for 100 and in country Y for 100. Moreover, assume the tax rates are equal to 10% in X and 20% in Y. The company will have tax liabilities equal to 5 in country X and to 20 in country Y. This suggestion could avoid multinational companies to use transfer pricing methods for tax purposes. The DBCFT presents many characteristics of economic efficiency. As we have just explained, it does not distort the location of investment, nor manipulate investment financial decisions. If taxation is based on the country of origin, where the production takes place, location decisions could be distorted based on different tax rates in the different countries. Companies will be induced to locate their subsidiaries in countries with lower tax rates. On the contrary, if taxation is based on the country of destination, the country where users are located, distortion is no longer possible. One could argue that companies will be tempted to move their production in the country with higher tax rate in order to deduct more costs and finish with a higher after-tax profit. However, Devereux et al. (2021) explain that prices and exchange rate will adjust to nullify the differences in tax rates of DBCFT across countries. Moreover, the DBCFT will remove the incentives to shift profits to low-tax countries. Firstly, pricing shifting is not possible, if we consider a sale of one good from one subsidiary to another subsidiary located in a different country, the former will not be domestically taxed on export and the latter will be taxed on import, but the cost of the good will be deducted from the tax base, being an asset for production, making the value of the import irrelevant for taxation. Furthermore, the other tax avoidance strategy consisting in manipulating IP location is unfeasible. Indeed, if, to use the IP, a subsidiary located in a high tax country buys a licence from another subsidiary located in a low tax country, there will be a tax liability for the import in the high tax country, which will be counterbalanced by a tax deduction for a cost in the high tax country. The main tax avoidance strategies are thus not allowed under the DBCFT. However, the adoption of the DBCFT would present significant problems both from an administrative and a legal point of view. On the one hand, it is arguable that the DBCFT could simplify administrative rules; in fact, the cash flow tax considers the immediate expensing of all business assets purchased, meaning that complicated depreciation schedules will not be necessary. Additionally, it would eliminate the interest deductions. Moreover, there will be no need for complicated anti-tax-avoidance rules, such as rules on transfer pricing. On the other hand, there are many issues that appear, such as the treatment of negative tax liabilities, the need to introduce a tax in the place of sale, which can be difficult for digital services. Furthermore, all bilateral and multilateral fiscal cooperation agreements signed in recent decades would become inapplicable, since otherwise they would be in conflict with the DBCFT. Clearly, creating a new taxation system by modifying the corporate income tax is challenging. The destination tax would imply to define the location of destination and the methods to

collect taxes in that country. The issues are related to the collection of tax revenues associated with cross-border business to consumer transactions. Devereux et al. (2014) propose that a company selling in different countries will have to register in one country, then this country's tax authority would manage the DBCFT at the rate of the country in which products are sold. Thus, they imagine a cooperation among tax authorities for the identification of the applicable beneficiary of the tax. This kind of cooperation would simplify administrative tasks for the company, which would not be asked to register and pay tax in each country into which it sells goods and services. The implementation of DBCFT as a corporate tax can have the same economic value of an increase of VAT plus a wage deduction or a payroll subsidy. If this method is used, the concept of destination will not be applied and authorities will simply have to use existing VAT law, which could simplify things. However, countries that do not have a VAT would better use the destination method.

We can argue that a DBCFT would be a very radical reform in the corporate tax. It would create many economic efficiencies by eliminating tax avoidance strategies and the countries' competition in reducing their tax rates. Moreover, for digital services and a data point of view, taxing in the country of users would be as taxing in the country of value creation. However, data are not really taken into account as an additional tax.

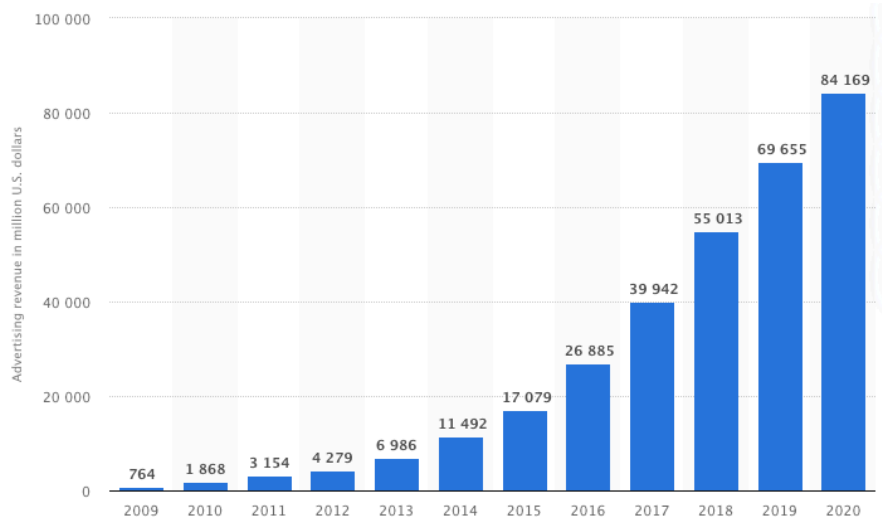
2. A new model for taxing corporate income

In this section we are going to show a possible way to address digital companies' taxation. We are going to prove the difficulty of measuring the value of data and why this constitutes such a challenge today.

a. Measuring the value of data

Having observed the main characteristics of digital business models and the advantages of data collection for digital companies, we consider that taxing data collection is necessary. To corroborate this statement and demonstrate the use and the importance of data collection for digital companies which mainly rely on advertising revenues, we will take as an example the Facebook company case. The following graph shows the evolution of Facebook's advertising revenue, which constitutes approximately 98% of Facebook's total revenue, from 2009 to 2020. We can see a strong increase in revenue, which increases by approximately 30% each year.

Figure 19: Facebook advertising revenues[34]



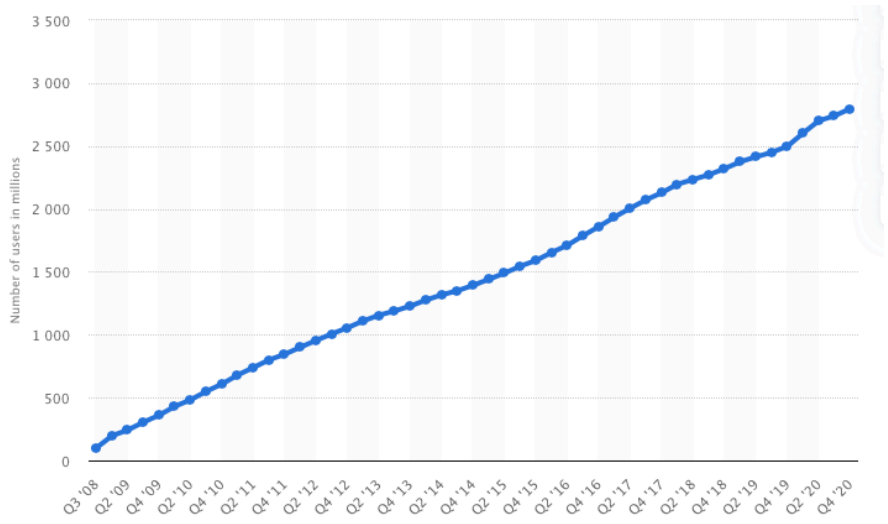
At this point, we can ask ourselves if this tremendous increment in revenue is due to an increase in the number of advertisers. Indeed, with the e-commerce development, more and more companies are willing to advertise using social networks. We can say that a proportional increase in the number of advertisers could prove Facebook's revenues growth. The following graph illustrates the evolution of Facebook's active advertisers from 2016 to 2020. We can see an increase in the number of advertisers; however, this increase is not proportional to the gain in revenues.

Figure 20: Facebook advertisers[35]

Another explanation for the increase in revenues could be a rise in the number of users. However, also in this case users' growth is not linearly proportional to revenue growth.

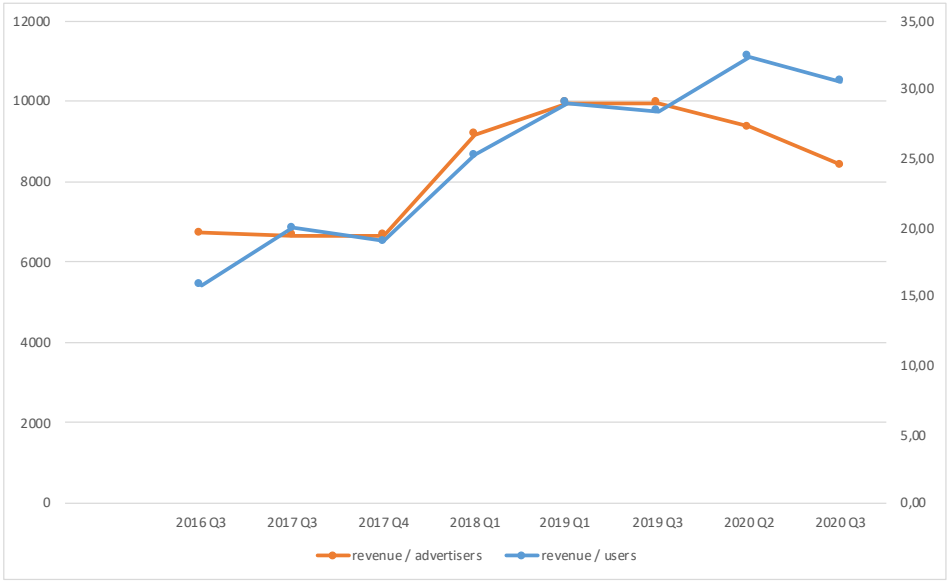
[34] Source: Statista (2021)
[35] i.d.

Figure 21: Facebook users[36]



The following graph shows how revenue per users and revenue per advertisers have evolved overtime. There is a clear increase in both ratios, proving that revenue growth is not only due to users and advertisers increase. Specifically, Facebook's average revenue per user increased in the same time span, going from USD 6.81 in 2013 to USD 32.03 in 2020.

Figure 22: Facebook revenue per advertisers vs revenue per users



Another possible reason for the increase in Facebook's revenues might be a possible increase in advertisers' prices. Advertisers cost for ads space is related to the number of clicks. Thus, we can say

[36] Source: Statista (2021)

that rather the price per click or the number of clicks should have increased. However, evidence shows that advertisers cost per click has remained constant in time. This means, that the only remaining component is the number of clicks made by users. This shows that Facebook uses data collection in order to improve advertising targeting, leading to an increase in the number of interested users for every kind of advertising. This short demonstration proves that data is an essential part of value creation and that it contributes to revenue's growth.

In order to measure the monetary value of users' data we are going to assess the value of firms which collect and use data. We propose three different approaches. The first one consists in the assessment of specific companies' revenues value with respect to their number of users. The second one is to look at individuals' willingness to pay for protecting their data. The last one is to show the part of revenues collected by specific companies, which is due specifically to data collection. Companies' reported revenues could represent a good indicator of users' data value. Revenues should be associated to the amount of data a company holds in order to measure the revenue per data. In order to identify the value of data we are going to use the revenue's value of companies which main business is to collect and sell data. Today, there is a wide market for personal data, which is now estimated around USD 300 billion a year. The larger data brokers include Acxiom, Experian, Oracle and Equifax. These companies collect data from different sources: they collect public information, such as information published or available on social networks, data from public institutions or third-party companies, or data they collect using their own technology for example using cookies on websites. In particular, we are going to use Equifax as the reference data broker company. Equifax is an American company and has been created in the 1930's. It is one of the largest data brokers. Indeed, it collects and maintains a very large amount of personal and financial information on individuals and businesses. Then, it uses this data to support companies by helping them to advertise more efficiently. The data can also be used to decide whether a business is worth investing in or not. Overall, the company collects, analyses and sells data. Therefore, the revenue it gets represents the value of data collection and analysis. In 2020, Equifax earned USD 4.128 billion in revenues[37]. Moreover, it collects data on 800 million consumers and on 88 million businesses worldwide[38]. Thus, if we measure revenue per persons or business, we find: $\frac{4128\text{M}}{888\text{M}} = 4.65$. The value of data per users is thus USD 4.65.

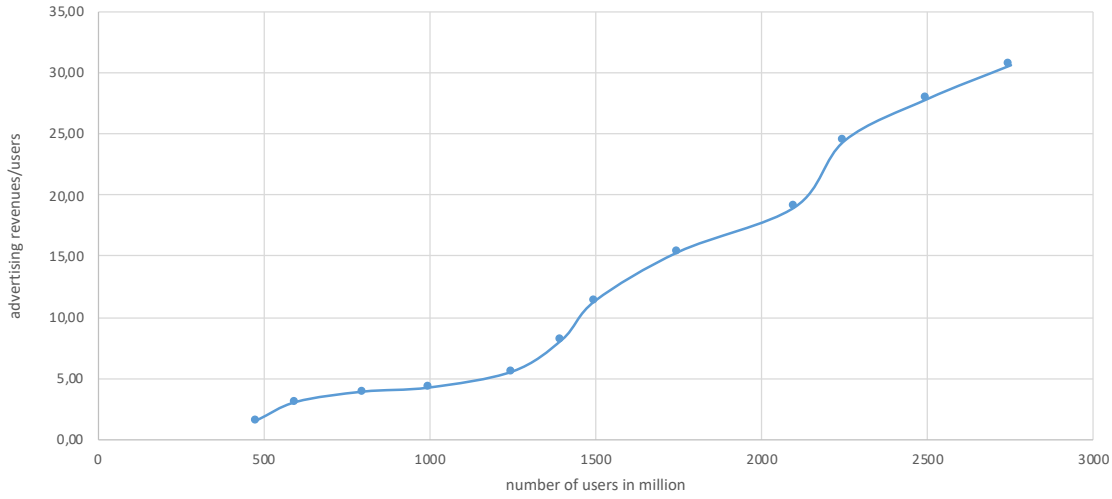
[37] Equifax Inc. (2021), Annual Report
[38] Wikipedia, Equifax

We can use the example of another data broker company called Axciom, which is a data provider for direct marketing and customer relationship management. It collects and stores consumers' data and helps companies manage customer data and integrate that information into marketing systems. Axciom annual revenues in 2018 amounted to USD 917.41 million[39] and it collected data on 500 million individuals[40]. With the same logic as before, we find that the value of data per users equals $\frac{917M}{500M} = 1.94$.

Another company that can be used as an example is Facebook, whose main goal is to sell advertising space. In order to provide more convenient advertising services, Facebook collects and uses users' data. In 2020, Facebook advertising revenues have been equal to USD 84.169 billion[41] and the users on which it collected data have been 2.700 billion[42]. Using the same reasoning, we find the value of revenue per users $\frac{84.169B}{2.797B} = 30.09$.

The following graph shows the Facebook's value of data, with respect to its users. We can see that the value of data increases with the number of users, meaning that the more data a company has, the more these data have a value because they are combined together. The value of data per users found for both Axciom and Equifax are coherent with Facebook's value represented in the graph.

Figure 23: Value of data

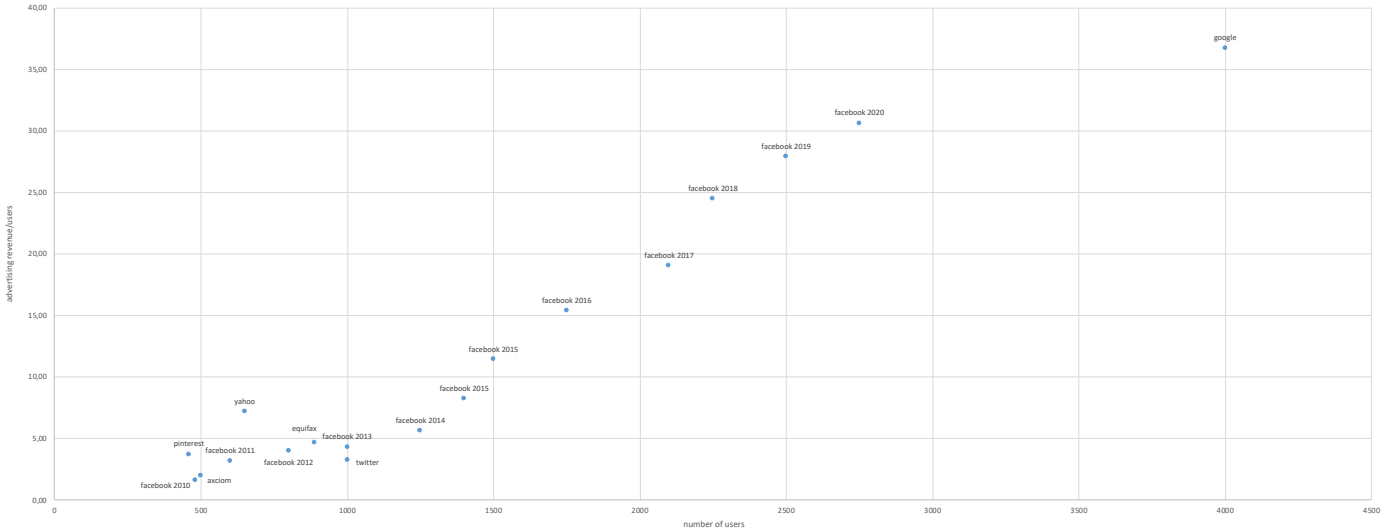


[39] Securities and Exchange Commission (2018), Axciom Corp
[40] WebFX Team (2020), "What Are Data Brokers – And What Is Your Data Worth? [Infographic]"
[41] See Annex
[42] Investor (2021), "Facebook Reports Second Quarter 2020 Results"

This approach allows us to observe the value of users, showing the amount of revenues it creates in a year. We find very different results for different companies. An explanation is that there can be other contributors to companies' revenues, such as intangible assets like algorithms and human expertise. Moreover, a single data does not have any value alone, but combined with many others it does. It is possible that the value of data is not linearly proportional to the number of data but increases at an exponential rate. Indeed, companies sell aggregated data, so the value of the data is the fact that they know a lot about many people. Thus, in some cases the value of users' data can be overestimated. From this method, we can conclude that the value of data per users is contained between USD 1 and 30 but it increases with the number of users.

We have added to the graph the value of data of the two data brokers, Equifax and Axciom, as well that of digital companies which main revenue is generated from advertising, such as Google, Twitter, Yahoo and Pinterest. From the graph, we conclude that the value of data, measuring with this method, still increases with the number of users.

Figure 24: Value of data



The second method consists in the identification of individuals' willingness to pay for their data protection. Many studies have been made about this argument. Acquisti (2004) finds that individuals have a very different perception of the cost and benefit of privacy protection. Steinfeld (2015) finds the same results, showing that users have different attitudes towards privacy. Bauer et al. (2012) ask Facebook users their willingness to pay in order to keep their own Facebook information. They find

an average willingness to pay of EU 9.45, thus approximately USD 11. The advantage of this method is that it shows the personal value of privacy and this value is not subject to market fluctuations. However, this measure does not have a market value and can vary a lot depending on individuals. Moreover, Acquisti et al. (2009) explain that valuation of privacy is not really a good estimator of the value of personal data. All in all, the value of USD 11 is in the range we found with the first method.

Finally in the last method, we can consider a model[43] where there is a data broker, that collects data and sells it to a company to provide targeted advertising. The company can choose to deliver basic advertising called "run of network", so the advertising will be disclosed to a vast number of users without the possibility to choose specific users; or it can choose to buy data from the data broker to provide targeted advertising. If the company chooses the run of network advertising it cannot choose a specific price for its product based on users' preference or willingness to pay, thus it will choose a price equal to c. On the contrary, if it chooses targeted advertising it can choose its price based on users $c(\alpha)$, where α represents users' ability to pay and $\alpha \in [0,1]$, 1 representing a consumer who is not able to pay for it and 0 representing a consumer with high ability to pay.

The consumers will buy the product when $u - c - r * \alpha = 0$, where u is the utility of receiving both the ads and buying the product, c is the product's price and r is the cost of receiving an ad that does not match consumer's ability to pay.

The goal of the company is to maximize c. If it offers non targeted advertisements, it will have

$$\int_0^1 c \, d\alpha = c - 0 = c = u - r$$

So, $c^* = u - r = \pi^{n.t.}$, which is the profit of the company if it chooses non-targeted advertising.

It it offers targeted advertisements, it will have

$$\int_0^1 c(\alpha) d\alpha = \int_0^1 u - r * \alpha \, d\alpha = u - \frac{r}{2}$$

So, $c^* = u - \frac{r}{2} = \pi^{t.}$, which is the profit of the company if it chooses targeted advertising.

[43] The proposed model is inspired by Montes et al. (2017)

From these two profits we can deduce that the company will buy data from the data broker at a value equals to $u - \frac{r}{2} - (u - r) = \frac{r}{2}$, which represents the value of data.

In order to apply this model to real data we have decided to use the cost per mille value, which is the cost advertisers have to pay for 1000 impressions. Beales (2010) finds the value of cost per mille for run of network advertising and the one for behaviorally targeted advertising equal to USD 1.98 and USD 4.12 in 2009 respectively. Today the value of cost per mille for targeted advertising is equal to USD 8[44] since the method for analysing data and the number of data available have improved and increased. Thus, we can say that approximately 75% of the value paid by advertisers is due to data, that make targeting possible. Therefore, 75% of companies' advertising revenues is due to users' data.

From this analysis we can argue that measuring the value of data is very complicated. The value of one person's data increases in a convex way if it is combined with other users' data. Moreover, the value might increase also for other reasons, such as powerful algorithms or high skilled labour force. We can conclude that data has a value and contributes to income revenues of digital companies. Therefore, from a taxation point of view, it is necessary, both to ensure fair countries' tax revenues as well as to limit profit shifting, to allocate income revenue which comes from users' data for taxation in the country where users are located.

b. The separation of profits among jurisdictions

The digital economy has completely revolutionized the value creation concept. The large productivity gains created by the digital economy are not captured as additional tax revenues by countries in which users are located. On the contrary, a significant part of the value tends to go to companies established in low-tax countries, which pay almost no taxes in the countries where they operate. Digital companies can easily engage in profit shifting methods and it is increasingly difficult to define the place of value creation.

As we have explained in the previous Chapter, the intensive use of user's data constitutes digital companies' main resources. Data allows companies to improve their services, to personalize them, to target ads to users, or can just be sold to third parties. Generally, data allows digital companies to reach a large number of users as well as high levels of revenues. Therefore, users create value for

[44] This is based on the average cost per mille of Facebook, Instagram, Twitter, LinkedIn, Pinterest and YouTube

companies providing their data, they are part of the production system. Clearly, users do not receive monetary compensation for their data, but they receive better services. However, the main issue for taxation is that users are located in one country while profits are declared in another country, thus companies do not pay their fair share of tax in the country where their contributors, namely the users, live. Countries where users are located contribute with public spending to the digital activity of their residents: thus, it seems logical that digital companies should provide additional public revenues in these countries. Corporate income tax should be reformed in order to take into account the benefits of the digital economy. The share of corporate tax paid in each country should consider the value creation located in each of these countries. The proposals of the EU Commission of a virtual permanent establishment could solve this issue. Virtual permanent establishment should consider the central role of data and users, which are common to every digital business models. The ability to mobilize users and to collect their data is equivalent to an asset that should be attached to a permanent establishment, and whose contribution should be remunerated. This notion should be accompanied by a definition of the contribution of different factors of production to the creation of value. For this, it is necessary to determine the profit's share of companies, which are attributable to users' data located in some territories. Therefore, it will be necessary to decide a measure representing the value of data, as it has been explained in the previous section. Having found the value of data, taxable profits will be distributed across countries according to the location of intangible assets, such as software or patent, commercial activities and users. Under a formula apportionment of corporate income taxation, net income would be measured on a global basis and then allocated among countries using a formula that takes into account the above-mentioned elements.

Let's consider a simplified model to explain the formula apportionment we are proposing. The model[45] includes a digital platform that involve users (u) and advertisers (a). For the users we consider the number of users' accounts and for the advertisers we consider the number of advertising contracts. The world consists of two countries: a high-tax country (x) and a low-tax country (y). Let u_x be the number of users and a_x the number of advertisers in country x. The same situation applies for country y. In order to have access to company's services, users provide their data. We assume that the more users the platform has, and the more data are collected, the more advertisers will be willing to pay for advertising services, since they will be able to offer more targeted advertising. The prices paid by advertisers is P_x in country x and P_y in country y, to buy advertising space and

[45] The proposed model is inspired by Bloch and Demange (2020)

services. The prices include two components: $P_x = d_x + p_x$. The value contributed by users' data is d_x and d_y. We can thus consider d as the value of data collected by the platform. The value of data d can be a fixed value for any data or can be an increasing function of u. Indeed, the more users the platform has the higher is the value of data.

Assuming that costs for the platform are negligible in the two countries, we can define the monetary value created in the countries before tax:
$V_x = a_x * d_x + a_x * p_x$ and $V_y = a_y * d_y + a_y * p_y$, with total value created equals to $V = V_x + V_y$
Let's also assume that countries have corporate income tax rates equal to t_x and t_y respectively, with $t_x > t_y$. Under the formula apportionment, total taxable profits will be allocated in the two countries with respect to the number of users' accounts and the number of sales, in this case advertising space sales.

$$Q_x = V * \left(\frac{u_x}{u_x + u_y} * \frac{d_x}{p_x + d_x} + \frac{a_x}{a_x + a_y} * \frac{p_x}{p_x + d_x}\right)$$

$$Q_y = V * \left(\frac{u_y}{u_x + u_y} * \frac{d_y}{p_y + d_y} + \frac{a_y}{a_x + a_y} * \frac{p_y}{p_y + d_y}\right)$$

Q_x and Q_y represent the taxable profits in the two countries, to which the tax rates will be applied. Then, the after-tax profit of the platform is given by: $R = V - Q_x * t_x - Q_y * t_y$.

Assuming that $d_x = d_y$ and $p_x = p_y$, so that the value of data is not increasing with the number of users, we can take the derivative of R with respect to u_x

$$\frac{\partial R}{\partial u_x} = \frac{\partial V}{\partial u_x} - \frac{\partial Q_x}{\partial u_x} * t_x - \frac{\partial Q_y}{\partial u_x} * t_y = -V * \frac{(u_x+u_y)-u_x}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x} * t_x - V * \frac{-u_y}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x} * t_y$$

$$= \left(V * \frac{u_y}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x}\right) * (t_y - t_x) < 0$$

Now taking the derivative with respect to u_y

$$\frac{\partial R}{\partial u_y} = \frac{\partial V}{\partial u_y} - \frac{\partial Q_x}{\partial u_y} * t_x - \frac{\partial Q_y}{\partial u_y} * t_y = -V * \frac{-u_x}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x} * t_x - V * \frac{(u_x+u_y)-u_y}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x} * t_y$$

$$= \left(V * \frac{u_x}{(u_x+u_y)^2} * \frac{d_x}{d_x+p_x}\right) * (t_x - t_y) > 0$$

Since $t_y < t_x$.

To maximise its profit the platform should decrease the users in the high-tax country while increase them in the low-tax country. So as to show low profit in the high-tax country and high profit in the low-tax country in order to pay less taxes. The company will want to reduce the number of users accounts in a specific country. However, it is arguable that reducing real users in a specific country is not possible, since attempting users' discrimination is unrealistic. But reducing fake users' accounts is possible. Moreover, increasing users in another country is also unlikely since we are considering a dominant platform which already has a maximum number of users. The platform can therefore increase its profit by reducing the number of users accounts in high-tax countries. By reducing users in a country, the profit for the other country will increase. However, we can argue that few accounts with respect to the total number of accounts are fake accounts. Thus, still a large part of profit will be allocated to high-tax country.

The platform can also maximise its profit by allocating advertising contracts in low-tax countries.

$$\frac{\partial R}{\partial a_x} = \frac{\partial V}{\partial a_x} - \frac{\partial Q_x}{\partial a_x} * t_x - \frac{\partial Q_y}{\partial a_x} * t_y = \frac{\partial V}{\partial a_x}\left(1 - \frac{(a_x+a_y)- a_x}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * t_x - \frac{-a_y}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * t_y\right)$$

$$= \frac{\partial V}{\partial a_x}\left(1 - \frac{a_y}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * (t_x - t_y)\right) > 0$$

And,

$$\frac{\partial R}{\partial a_y} = \frac{\partial V}{\partial a_y} - \frac{\partial Q_x}{\partial a_y} * t_x - \frac{\partial Q_y}{\partial a_y} * t_y = \frac{\partial V}{\partial a_y}\left(1 - \frac{-a_x}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * t_x - \frac{(a_x+a_y)- a_y}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * t_y\right)$$

$$= \frac{\partial V}{\partial a_y}\left(1 + \frac{a_x}{(a_x+a_y)^2} * \frac{p_x}{d_x+p_x} * (t_x - t_y)\right) > 0$$

We can see that increasing a_y while decreasing a_x is convenient for the company, since revenue is increasing in a_x at a lower rate than in a_y. Therefore, profit shifting is still available under this model, since advertising contracts are easily transferable to any country. However, still a consistent part of the profit, the one created by users' data, can be taxed in the country where users are located, that is where part of the value is created.

Then, if we consider that d_x is a function of u_x and is increasing in u_x, then the same reasoning as for the advertising contracts apply for the users. Profit shifting will still be possible for the platform. However, as we explained shifting users will be possible only for a small number of accounts.
We propose a taxation related to data collection on users in a specific country. This taxation system would guarantee tax neutrality with respect to digital business models and their location strategies. It would allow to link taxation to the territory where value is created and to consider the value of data. Indeed, as data have a central role in the digital economy and they are common to every digital

business models, taxing them will enable to tax any type of digital companies and respect the concept of neutrality. Finally, it will allow taxation based in the data's original countries, in other words, the countries where users reside.

The taxation will not be an indirect tax on data collection, since this kind of tax does not respect the equality principle. Indeed, it is possible that the tax burden on a company will not respect its ability to pay. Clearly, all data does not have the same economic value, and the amount of data collected does not necessarily indicate the benefits that this data could provide in the future. The tax will be a direct taxation of the corporate income and will be related to the number of users accounts. The tax will be applied in a specific country, to every companies which have a large amount of users in this country. For instance, the European Digital Service Tax is applied to foreign digital companies with at least 750 thousand users in a certain country.

The tax could be a flat tax, meaning that it would be a specific rate applied to every companies with a sufficient number of users, but the rate will not increase with the number of users. But it could also be a progressive tax, increasing with the number of users. In order to implement this territory taxation, we could think of implementing a virtual permanent establishment for foreign companies which have a certain number of users in the country. Indeed, data collection is an activity, which is not auxiliary, and which contribute a lot to the value creation. Therefore, it could constitute a permanent establishment. It is important to apply the tax only for companies with a certain number of users, in order not to affect small companies and startups, which could otherwise be forced to exit the market or be refrained to enter. Additionally, the revenues that will be split among jurisdictions will represent total revenue per region. This means that European revenue will be distributed among European countries. This is because the contribution to digital companies' revenues varies a lot from region to region. We can assume that advertisers will be more willing to target European users rather than users from poorer countries. Indeed, poor countries might have much more users, but these users' data might be less interesting for advertisers since these people have less purchasing power. Thus, in order to make the model fairer we decided to focus only on specific regions revenues. To make a clear example of the different regions' contribution, let's consider the Facebook case. Facebook has 387 million users in Europe, while it has 744 million users in the Asia-Pacific region. However, it made approximately USD 20 billion revenues in Europe compared to just USD 15 billion in Asia-Pacific.

c. Application of the model

In this section, a simplified application of the model will be presented. We will concentrate on the Facebook and Google cases in Italy. Today, very few taxes are paid by these two multinational

companies in Italy, Google had paid EU 5.7 million and Facebook EU 2.3 million, in 2019[46]. These taxes seem very low with respect to the large number of users in Italy, which contribute with their data and with clicks on advertising.

Facebook has approximately a taxable income in Europe equals to USD 6960 million. Facebook has 29.2 million users in Italy, which represents the 7.5% of European total users. Moreover, looking at today revenues declared in Italy, we can consider, that only a very small percentage of advertising contracts are registered in Italy. We can then assume that this percentage is similar to 0. In order to apply the formula, it is necessary to choose a value for data. With the first method presented above, where the value of users depends on the number of users, a progressive tax could be introduced. Thus, the ratio applied to users will increase with the number of users. It will be therefore necessary to decide a correct ratio. With the second method, the value of data is equal to 11. However, this method cannot be applied to companies that have a ratio of revenues over users lower than 11. Therefore, this second method can be applied only to large companies and is not very realistic. Finally, with the third method the tax will be flat. This method is very easy to implement and is fair since largest companies will not be penalized; however, as we are going to see in the next section, that it is not the best solution to solve disinformation challenge and other externalities. Nevertheless, since the last method is the most straightforward one, we are going to use this last method to measure the value of data, more specifically the value of $\frac{d_x}{d_x+p_x}$. Thus, we are going to use the value of 75%.

Applying the formula above we find:

$$6960 * (0.75 * 0.075 + 0.25 * 0) = 391.5$$

The taxable profit in Italy is thus USD 391.5 million at a rate of 24%. We derive USD 93.96 million in taxes, which is much more than EU 2.3 million.

Let's consider now the Google case. Google gained USD 146.9 billion in 2020 from advertising revenue, of which USD 44.97 billion in the EMEA region. Its net income is USD 12300 million in this region. Moreover, Google has 600 million users in Europe and 36 million users in Italy so 6%.
By applying the same formula:

$$12300 * (0.75 * 0.06 + 0.25 * 0) = 553.5$$

We find a taxable profit in Italy of USD 553.5 million at a 24% corporate income tax rate, we find that Google would pay USD 132.8 million in tax.

[46] Il fatto quotidiano (2020), "Le tasse pagate in Italia dai giganti web: Amazon 11 milioni di euro, Google 5,7 milioni, Facebook 2,3 mln, Netflix 6 mila euro."

From this analysis, we can see that large companies are going to pay much more taxes in some countries. These tax payments will be related to the number of users they have and thus on the number of data they collect.

In summary, this thesis proposes a corporate income taxation for digital companies based on the number of users' accounts and the number of advertising contracts in a specific country. We propose to determine a company's advertising taxable profit at the regional level and then split the taxable profit among countries within that region. The profit will be separated based on the number of users and advertisers, thus the more users or advertisers a country has the more taxable profit it will receive. Then, in order to determine the apportionment coefficients for the users and for the advertisers, we could think of using a progressive coefficient. Thus, the more users' accounts a country has the larger will be the part of the profit attributable to users. This is because the more users a country has the more data it has and the bigger is this data value. In the application above we use as apportionment coefficient the value of 75%, which seems to be a good measure for the large companies as Google and Facebook. However, a broader and complex analysis would be required to determine the coefficients for every kind of companies depending on their users' number.

3. Consequences of the model

In this final section, the consequences of the model will be explored. In particular, the impact on disinformation will be analysed together with other possible consequences.

a. Reduction of disinformation

In the previous chapter, the disinformation challenges have been presented. We have shown how digital companies algorithms allow fake news distribution. Indeed, companies profit from data collection and the more users are connected to the platform the more data they will share. Disinformation and fake news are a way to maintain users connected since these kinds of news particularly catch the attention. In order to tackle this problem, a solution could have been to directly tax data collection. For example, by taxing each data provided in the platform. If that was the case, companies would decide to decrease data collection. It is reasonable to believe that digital companies today collect any kind of data, even useless ones that do not create any value. Therefore, by taxing data collection, they would be more tempted to collect only necessary data, the one necessary to create

value, in order to decrease their tax burden. Companies would want to collect a lower amount of data and thus, would rely less on fake news distribution, as a way to keep users connected for the longest time possible. Overall, this will decrease disinformation.

Our model, that taxes companies on the number of users is also a way to fight against disinformation. Indeed, fake news are usually posted on digital platforms from fake accounts, since nobody will want to be traced as the person who published a fake news. Moreover, fake accounts can be created in order to create fake news. For instance, in 2013, before the Italian elections, many fake accounts have been created to follow the major candidates. This, in turn, brought the newspapers to report incorrect statistical data for the candidates. Thus, if fake news is spread across the web through fake accounts, taxing the number of users, that is the number of accounts, will give a strong incentive to digital companies to detect their fake accounts and to eliminate them. In this way disinformation will be strongly limited. Boshmaf et al. (2015) estimate that approximately 14 million Facebook's monthly active users, in 2015, were detrimental for the company, as they represented mischievous fake accounts created in violation of Facebook's terms of service. Moreover, in 2018, Facebook estimated[47] that nearly 88 million accounts were fake accounts. These accounts contributed to malicious activities and to the spread of disinformation.

We believe that taxing companies where their users are located, will give these companies the motivation to reduce their users in high tax countries, so that lower taxes can be paid in high tax countries, but in order to do so they will decrease the number of fake accounts, which do not really contribute to the companies with relevant data. However, we can argue that, as the digital companies will want to reduce the number of fake accounts located in high tax countries, they will also want to increase the number of fake accounts in low tax countries. An illegal practice could be to create fake accounts by itself in order to report a high number of users in low tax countries. In order to solve this problem of tax shifting, we can argue that authorities will have to give a strong attention to low tax countries and control the number of accounts reported with respect to the population of the country, to ensure that the number of accounts is realistic. Additionally, some fines may be introduced against companies that create fake accounts. Finally, if the tax proposed is progressive, meaning that it increases with the number of users, then the company will have a strong incentive to decrease the number of fake accounts in each country. This solution seems the most appropriate one to fight disinformation.

[47] Facebook (2018), "Facebook Publishes Enforcement Numbers for the First Time"

The tax proposed would have a similar function as the polluter-tax or the carbon-tax. However, it would not apply to greenhouse gas emissions, but to the number of users' accounts. This tax would discourage some bad practices. As presented in the previous chapter, the digital economy based on data collection creates many negative externalities. Externalities with respect to disinformation, to the environment and to privacy. Thus, introducing a tax based on users can be seen as a partial solution for these problems. Indeed, by reducing the number of accounts, companies would automatically collect less data that is a first remedy for the data storing pollution challenge. Secondly, by blocking malicious fake accounts, companies would also contribute to the protection of privacy. Indeed, many fake accounts are phishers, trackers, or hackers, that steal people identity and data and that can engage in illegal practices. This tax apart from raising revenues for the countries where users are located, can also be seen as a Pigouvian tax. The Tax Foundation defines Pigouvian tax, named after the economist Arthur C. Pigou, as a tax on market transaction that creates a negative externality or a cost, endured by people who are external or not directly involved in the transaction. This kind of tax is usually used to correct bad behavior. Indeed, if the company pollutes, or, in our case, allows the propagation of fake news or the malicious behavior of certain individuals, and if this pollution causes a harm to people living in the area, or using the digital platform, then the company should pay a tax for this pollution. Thus, companies will continue to have fake accounts, which in part contribute to the production of data by other users, until their value derived from this data exceeds the tax.

b. Other consequences

Nowadays, European countries face unfair tax revenues from the main digital companies. Indeed, these companies are part of the everyday lives of almost every European citizens, which contribute to their value providing their data. However, these digital companies do not pay for users' data and they do not contribute to the countries' public goods. Indeed, these companies can avoid having a physical presence in most countries. Moreover, thanks to their business models and their high reliance on intangible assets, digital companies are able to easily shift their profits to low-tax countries. This practice further reduces the taxable revenues available to high-tax countries.

This model of taxation will allow a fair redistribution of profit to each country where users are located. Since users' data are the main source of profit for digital companies, it is fair to believe that these companies should contribute to public goods in users' countries. Thus, this model efficiently captures value creation, but it will be necessary to choose a correct value for data. Furthermore, the fact that users are immobile will reduce the possibility to shift profit to low-tax countries. This model will

allow to ascertain that finances of countries will be sustainable and that tax bases will not be eroded in the future. Overall, this model will allow countries to raise revenues which are particularly urgent in this time of Covid pandemic. We can observe from the application of the model, that more equally distributed taxes also mean higher taxes for digital companies. Indeed, today, digital companies face a very low tax rate. For instance, Facebook faces a tax rate equals to approximately 12%. While the mean value of corporate income tax rates in the OECD countries is 20.9%, which is nearly 75% more. Companies will have to pay a larger amount of their profits into taxes. These higher tax payments could lead companies to pass the tax burden to users. Indeed, they could, for instance, introduce a subscription price for services that are now free. This possibility can however have some advantages. Firstly, it will decrease the number of time people spend on digital platforms. Secondly, we will get a true value for users' data, that will allow a fair taxation. Another possibility is that companies will increase the price for advertisers, in order to pass them the tax. Finally, a third risk is that they will invest less on innovation. Indeed, higher payments will reduce their innovation capacity. These risks could at the end result in positive effects for competition. In fact, by introducing users' fees or by increasing advertisers' costs, both users and advertisers will be reduced. This can allow competitors to enter the market and could be the end of large digital monopolies. This taxation method could be a way to limit big tech companies' market power, that is today difficult to contrast with antitrust law. Moreover, competition will allow to restore innovation capacity that is usually constrained by monopoly power.

Conclusion

This thesis has illustrated the developments of the digital economy, studying in particular the issues related to the digitalisation for the international tax system. The thesis has also presented the new solutions as well as a potential model for corporate income taxation.

Globalisation and digitalisation have led to a substantial transformation of the traditional business models. For this reason, international authorities are concerned with the current tax system and realize the need to reform it, in order to restore fair taxation and equal distribution of revenues among countries. Today, digital companies are using techniques to avoid taxation in many countries in which they operate and are transferring their revenues in low-tax countries. This situation is leading to a tax base erosion and poses many problems for governments willing to collect tax revenues. Indeed, tax avoidance reduce government revenues, which in turn decrease the quality of public services and transfer the tax burden to other companies and citizens, creating inequalities. Small businesses are weakened together with competition.

This thesis has first illustrated the main characteristics of digital companies' business models. Digital companies are often organized as multi-sided platforms and take advantage from network effects. Moreover, they rely on users' data and intangible assets as value creation factors. These characteristics can often lead digital companies becoming monopolies, thanks to the comparative advantage based on their number of users and data with respect to other companies. The digital companies can be of many different forms. In particular, many of them are digital platforms and make revenues by engaging in online advertising or e-commerce activities. The specific features of digital companies are new to the economy and constitute challenges linked to the taxation system. Indeed, the current tax system for multinational companies relies on the concepts of permanent establishment and arm's length principle. Under the permanent establishment, a multinational company is subject to taxation in a certain country whenever it has a physical presence and additional elements for being subject to tax. While the arm's length principle is a way to measure the correct value of assets traded from one subsidiary company to another. These elements are challenged by digital companies' business models, that are able to be present in a country without having a physical presence, thus without having a permanent establishment, required for taxation. Moreover, they rely on intangible assets, which value is difficult to measure under the arm's length principle. The current tax system is therefore inconsistent with the characteristics of new business models. These issues have also led to

competition among countries, which are decreasing their corporate income tax, and also their profits from taxation. Today, digital are using profit shifting techniques to avoid taxation in high tax countries. They rely mainly on transfer pricing methods, by showing high prices in low-tax countries and low prices in high-tax countries. Another method increasingly employed is intellectual property location, which is easily transferable in low tax countries. Then, this thesis has examined the importance of data for digital companies. Nowadays, these companies offer to consumers their services for free, in exchange to their data and to a continuous observation of their activities. This new form of economy can be seen as a barter of data in exchange to services. These barters are possible since companies value users' data a lot and use them to create value. Data collection constitutes the core activity of the business. Usually, data is used to target advertising but can also has other utilization, such as data selling. The importance of data and the high reliance of digital companies, raise the question on whether and how to tax data. Indeed, today, the value arising from user-generated data is not taxed. We argue that data could preferably be taxed under corporate income tax rather than under VAT as a form of barter transaction. The economy is largely based on data, which is considered the new oil of even the new money. However, data collection by digital companies can have some consequences. Firstly, the high reliance on data leads companies to maintain their users the long time possible on the platform and this technique supports disinformation and fake news, which are captivating elements. Secondly, data can also create other challenges such as environmental issues linked to data storing and privacy issues. Therefore, taxing data could also address some social and economic issues. Finally, the thesis investigated the solutions and proposals of the OECD. The main goal is to ensure fair taxation aligning taxation with value creation. The OECD proposed a two-pillar approach: pillar one regards the re-allocation of taxing rights and the creation of a new tax nexus, while pillar two supports the introduction of a global minimum tax. The proposals of the European Union are based on two different solutions: a short-term and a long-term one. The former one includes a digital service tax while the last one would lead to the creation of virtual permanent establishment. Then, many economists have proposed different ways to address taxation of digital companies. An interesting idea is the Destination Based Cash Flow tax, which consists in taxing cash flows in the location of destination. Then, the thesis proposes a model. We propose to measure the value of data with three different methods. However, from the analysis it has emerged that finding a value for data is extremely complex. We have shown that the value of one user's data increases when the company also collects other data, which can lead to a progressive taxation increasing with the number of users. The taxable profits should then be correctly distributed among countries where companies operate, even if they operate remotely. Thus, the profits will be distributed on the basis of the number of users' accounts and advertisers. Applying our simple model,

we have found that digital companies will be subject to much more taxes in high tax countries, in which today approximately no taxes are paid. Clearly, this model has some consequences that are analysed in the thesis. This new corporate income tax could lead to the decrease of fake accounts, which usually support disinformation. Thus, this taxation will limit fake news and other malicious activities run through fake accounts. However, companies might be tempted to pass their tax burden on users or advertisers. This possibility does not have only negative aspects, indeed, less individuals will use digital platforms and competition can be increased.

This thesis has illustrated the importance of data for the digital economy. Data can be viewed today as the new "oil" or even the new "money" and the reliance on data will be increased in the following years. If data will become prevalent in the economy, a possibility could be to use it as a new tax base; thus, income would no longer be taxed alone as data would also be taxed. With this solution the tax system could be completely revolutionized, leaving behind us the corporate income tax as we know it today. However, since the challenges raised by the digital economy are urgent, a simpler solution, as the one proposed in this thesis, could be more suitable. What is essential today is to find a common solution, which could deal with the taxation inequalities between digital and non-digital companies. Indeed, the main and most valuable companies are only paying a small part of government revenues and unfortunately the current pandemic crisis has only contributed to worsen this situation. The European Commission has recently published a communication on business taxation, in which it argues that digital companies' taxes are not always attributed to countries where the value is created. The European Union shares the view that taxes should be fairly distributed among countries and that the tax system should be simple and reduce tax distortions.

During the G7 meeting in London in June 2021, the finance ministers finally reached an agreement on reforming the multinational companies' taxation system. They agreed on a minimum global tax on multinationals of 15%. Moreover, they decided that the 20% of large companies' profits that exceed the 10% of profitability margins, will be allocated and taxed in countries where sales are effectively realized, in order to avoid companies to declare their profits in low tax countries or tax havens. This agreement has partially ended the debate on corporate income taxation in the digital economy, but the world still needs the approval of the G20 and OECD members as well as decisions regarding the allocation of taxable profits. However, this solution seems to be a first step in tackling taxation system reforms.

Bibliography

Acquisti A., (2004), "Privacy in electronic commerce and the economics of immediate gratification", in *Proceedings of the 5th ACM conference on Electronic commerce*, pp. 21-29.

Acquisti A., (2009), "Nudging privacy: The behavioral economics of personal information", *IEEE security & privacy*, 7(6), pp. 82-85.

Acquisti A., Taylor C., Wagman L., (2016), "The economics of privacy", in *Journal of economic Literature*, 54(2), pp. 442-492.

Adzic J. et al., (2017), "Towards the future social media", in *New European Media White Paper*, Vital Media Project, Horizon 2020 Programme, EU.

Al-Debi M.M., El-Haddadeh R., Avison D., (2008), "Defining the business model in the new world of digital business", *AMCIS 2008 Proceedings,* 300.

Altshuler R., Grubert H., Newlon T. S., (2009), "Has U.S. Investment Abroad Become More Sensitive to Tax Rates?", in *International Taxation and Multinational Activity,* pp. 9-38, National Bureau of Economic Research, University of Chicago Press.

Alvarez-Martinez M.T., Barrios S., d'Andria D., Gesualdo M., Nicodème G., Pycroft J., (2021), "How large is the corporate tax base erosion and profit shifting? A general equilibrium approach", in *Economic Systems Research*, pp. 1-32.

Amit R., Zott C., (2001) "Value creation in e-business", *Strategic management journal*, 22(6-7), pp. 493-520.

Asen E., (2020), "What European OECD Countries Are Doing about Digital Services Taxes", in *The Tax Foundation*.

Aslam A., Shah A., (2020), "Tec(h)tonic shifts: taxing the digital economy", in *IMF Working Papers,* International Monetary Fund.

Auerbach A.J. et al., (2017), "Macroeconomic modeling of tax policy: A comparison of current methodologies", in *National Tax Journal*, 70(4), pp. 819-836.

Auerbach A.J., Devereux M.P., Keen M., Vella J., (2017), "Destination based cash-flow taxation", in *Oxford Legal Studies Paper Research,* n°14*,* Oxford University Centre for Business Taxation.

Auerbach A.J., Devereux M.P., Keen M., Vella J., (2017), "International tax planning under the destination-based cash flow tax", in *National Tax Journal*, 70(4), pp. 783-802.

Avi-Yonah R.S., (2007), "International tax as international law: an analysis of the international tax"*,* in *Tax L. Rev.* 57, 483.

Azemar C., Corcos G., (2009), "Multinational firms' heterogeneity in tax responsiveness: The role of transfer pricing", in *The World Economy,* 32(9), pp. 1291-1318.

Barrios S., Huizinga H., Laeven L., Nicodeme G., (2012), "International taxation and multinational firm location decisions", in *Journal of Public Economics*, 96(11-12), pp. 946-958.

Bauer C., Korunovska J., Spiekermann S., (2012), "On the value of information-what Facebook users are willing to pay", *ECIS 2012 Proceedings*.

Bauer G., Fritz J., Schanz D., Sixt M., (2019), "Corporate income tax challenges arising from digitalised business models", *Available at SSRN 3348544.*

Beales H., (2010), "The value of behavioral targeting", in *Network Advertising Initiative*, 1.

Bergemann D., Bonatti A., (2019), "Markets for Information: An introduction", in *Annual Review of Economics*, 11, pp. 85-107.

Bethencourt C., Kunze L., (2019), "Tax evasion, social norms and economic growth", in *Journal of Public Economic Theory*, 21(2), pp. 332-346.

Biglaiser G., Calvano E., Crémer J., (2019). "Incumbency advantage and its value", in *Journal of Economics & Management Strategy*, 28(1), pp. 41-48.

Bird R.M., Mintz J.M., (1996), "Why Tax Corporations?", Department of Finance, Technical Committee on Business Taxation, vol. 92, pp. 194-203.

Bloch F., Demange G., (2021), "Profit-splitting rules and the taxation of multinational digital platforms: comparing strategies", in *International Tax and Public Finance*, pp.1-35.

Boshmaf Y., et al. (2015), "Integro: Leveraging Victim Prediction for Robust Fake Account Detection" in *OSNs. In NDSS*, 15, pp. 8-11.

Brody D. C., Meier D. M., (2018), "How to model fake news", *arXiv preprint arXiv:1809.00964.*

Brousseau E., Penard T., (2007), "The economics of digital business models: A framework for analyzing the economics of platforms", in *Review of Network Economics*, 6(2), pp. 81-114.

Caillaud B., Jullien B., (2003), "Chicken & egg: Competition among intermediation service providers", *RAND journal of Economics*, pp. 309-328.

Candau F., Le Cacheux J., (2018), "Taming tax competition with a European corporate income tax", in *Revue d'économie politique*, 128(4), pp. 575-611.

Carpentieri L., Micossi S., Parascandalo P., (2019), "Overhauling corporate taxation in the digital economy", in *CEPS Policy Insight.*

Cennamo C., Santalo J., (2013), "Platform competition: Strategic trade-offs in platform markets" in *Strategic management journal*, 34(11), pp. 1331-1350.

Corrado C., Hulten C., Sichel D., (2009) "Intangible capital and US economic growth", *Review of income and wealth*, 55(3), pp. 661-685.

Cozmei C., (2015), “Is it Any EU Corporate Income Tax Rate-Revenue Paradox?”, in *Procedia Economics and Finance,* 23, pp. 818-827.

Cui W., (2019), “The digital services tax: A Conceptual Defense”, in *Tax Law Review,* vol. 73(1), pp. 69-111.

Davenport T., (2014), *Big data at work: dispelling the myths, uncovering the opportunities*, Harvard Business Review Press.

Davies R. B., Voget J., (2008), “Tax Competition in an Expanding European Union,” *Working Papers 0830*, Oxford University Centre for Business Taxation.

De Filippi P., (2013), “Taxing the cloud: introducing a new taxation system on data collection? ”, in *Internet Policy Review*, 2(2), pp. 1-7.

De Loecker J., Eeckhout J., Unger G., (2020), “The rise of market power and the macroeconomic implications” in *The Quarterly Journal of Economics*, 135(2), pp. 561-644.

De Mooij R.A., Nicodème G., (2008), “Corporate tax policy and incorporation in the EU”, in *International Tax Public Finance,* 15(4), pp. 478–498.

Desai M.A., (2009), “The decentering of the global firm”, in *The World Economy*, 32(9), pp. 1271-1290.

Devereux M.P., Sorensen P.B., (2006), “The corporate income tax: international trends and options for fundamental reform”, Brussels: European Commission, Directorate-General for Economic and Financial Affairs.

Devereux M. P., de la Feria R., (2014), “Designing and implementing a destination-based corporate tax”.

Devereux M.P. et al. (2021), *Taxing profit in a global economy*, Report of the Oxford International Tax Group, Oxford University Press.

Donnelly D., (2021), “What is permanent establishment and why does it matter?”, in *New Horizons Global Partners*.

Dubosson-Torbay M., Osterwalder A., Pigneur Y. (2001), “Web: inforge. unil. ch/aosterwa”

European Commission, (2018), “Fair Taxation of the Digital Economy”. EC Taxation and Customs Union publishing, Brussels.

European Commission, (2018), “Proposal for a Council Directive on the common system of a digital services tax on revenues resulting from the provision of certain digital services”, Mitteilung vom 21. März, COM (2018), 148.

European Commission (2018), “Digital taxation: Commission proposes new measures to ensure that all companies pay fair tax in the EU”, in *European Commission Press Release,* Brussels.

European Commission (2018), "Conditions for there being a taxable transaction when Internet services are provided in exchange for user data", in *Value added Tax Committee, Working Paper* n°958, Directorate-General Taxation and Customs Union.

European Commission (2020), "An action plan for fair and simple taxation supporting the recovery strategy", *Communication from the Commission to the European Parliament and the Council,* COM(2020) 312 final*,* Brussels.

European Commission (2020), "Questions and answers on the tax package", in *European Commission Press Corner.*

European Commission, (2021), "Tackling online disinformation", EC brochure in "*Shaping Europe's digital future"*, Brussels.

European Commission, (2021), "How do online platforms shape our lives and businesses?", EC Brochure in "*Shaping Europe's digital future"*, Brussels.

European Commission (2021), "Business Taxation for the 21st Century", *Communication from the Commission to the European Parliament and the Council,* COM(2021) 251 final, Brussels.

Evans D.S., (2009), "The online advertising industry: Economics, evolution, and privacy", in *Journal of economic perspectives,* 23(3), pp. 37–60.

Gao L., Huang J., (2017), "Achieving an efficient and fair equilibrium through taxation", in *2017 23rd Asia-Pacific Conference on Communications*, pp.1-6. IEEE.

Gordon R.H., (2010), "Taxation and Corporate use of debt: Implications for tax policy", in *National Tax Journal,* vol. 63(1), pp. 151-174.

Global, D. T.P., Georgijew I., Chung K., (2020), "Testing the meaning of the arm's-length principle in 2020 and beyond", in *International Tax Review*.

Govindarajan V., Srivastava A., Warsame H., Enache L., (2019), "The Problem with France's Plan to Tax Digital Companies", in *Harvard Business Review,* 17.

Grubert H., (2003), "Intangible income, intercompany transactions, income shifting, and the choice of location", in *National Tax Journal,* vol. 56(1), pp. 221-242.

Gupta M., George J.F., (2016), "Toward the development of a big data analytics capability", in *Information and Management,* 53(8), pp. 1049-1064.

Hadzhieva E., (2016), "Tax challenges in the digital economy", in *Study for the TAX2 Committee*, European Parliament, Directorate-General for Internal Policies, Economic and Scientific Policy Department.

Hadzhieva E., (2019), "Impact of digitalisation on international tax matters", in *Study for the TAX3 Committee*, European Parliament, Directorate-General for Internal Policies, Economic and Scientific Policy Department.

Haskel J., Westlake S., (2017), *Capitalism without capital*, Princeton University Press.

Haufler A., Schjelderup G., (2000), "Corporate tax systems and cross-country profit shifting", in *Oxford Economics Papers,* 52(2), pp. 306-325.

Hines J. R., (1999), "Lessons from behavioral responses to international taxation", in *National Tax Journal,* 52(2), pp. 305-322.

Hoffart B., (2007), "Permanent Establishment in the Digital Age: Improving and Stimulating Debate Through an Access to markets Proxy Approach", in *Northwestern Journal of Technology and Intellectual Property,* 6, p. 106.

Huizinga H., Laeven L., (2008), "International profit shifting within multinationals: A multi-country perspective", in *Journal of Public Economics,* 92(5-6), pp. 1164-1182.

Iyer G., Soberman D., Villas-Boas J. M., (2005), "The targeting of advertising", *Marketing Science*, 24(3), pp. 461-476.

Karabarbounis L., Neiman B., (2014), "The global decline of the labor share", in *The Quarterly journal of economics,* 129 (1), pp. 61-103.

Katz M. L., Shapiro C., (1985), "Network Externalities, Competition, and Compatibility", in *American Economic Review*, 75(3), pp. 424-440.

Kawano L., Slemrod J., (2016), "How do corporate tax bases change when corporate tax rates change? With implications for the tax rate elasticity of corporate tax revenues", in *International Tax and Public Finance*, 23(3), pp. 401-433.

Lamassoure A., (2017), "Draft Report on the proposal for a Council directive on a Common Consolidated Corporate Tax Base (CCCTB)". European Parliament, Committee on Economic and Monetary Affairs.

Laudon K. C., Traver C. G., (2013), *E-commerce*, Boston, MA: Pearson.

Lim S., Woo J., Lee J., Huh S.Y., (2018), "Consumer valuation of personal information in the age of big data", in *Journal of the Association for Information Science and Technology*, 69(1), pp. 60-71.

Loran M., Villa E., (2019), "The digital economy and the OECD's proposal to address current business models: radical change?", in *Osborne Clarke*, *Lexology*.

Lowry S., (2015), "Digital Services Taxes (DSTs): Policy and Economic Analysis", in *Congressional Research Service Report*, 45532.

Mariani M. M., Borghi M., Gretzel U., (2019), "Online reviews: differences by submission device", in *Tourism Management*, 70, pp. 295-298.

Martini J.T., Niemann R., Simons D., (2012), "Transfer pricing or formula apportionment? Tax-induced distortions of multinationals' investment and production decisions", in *Contemporary Accounting Research*, 29(4), pp. 1060-1086.

Mayer-Schönberger V., Ramge T., (2018), *Reinventing capitalism in the age of big data*, Basic Books.

Meltzer J.P., (2020), “The use of data in the digital economy”, in *WTO Conference,* Brookings Institution, Washington D.C.

Montes R., Sand-Zantman W., Valletti T., (2019), "The value of personal information in online markets with endogenous privacy*",* in *Management Science*, 65(3), pp. 1342-1362.

Motiwalla F., Luvai L., Xiaobai B., Xiaoping L. (2014), "Privacy paradox: Does stated privacy concerns translate into the valuation of personal information?", in *PACIS 2014 Proceedings*, 281.

Nguyen, D. and M. Paczos (2020), "Measuring the economic value of data and cross-border data flows: A business perspective", *OECD Digital Economy Papers*, n°. 297, OECD Publishing Paris.

Nicodème G., (2008), “Corporate income tax and economic distortions”, in *Taxation Papers*, 15.

Nuccio M., Guerzoni M., (2019), “Big data: Hell or heaven? Digital platforms and market power in the data-driven economy”, in *Competition & Change,* 23(3), pp. 312-328.

OECD (2005), “Articles of the Model Convention with respect to Taxes on Income and on Capital”. OECD Publishing, Paris.

OECD (2008), “Tax effects on foreign direct investment”, in *OECD Policy briefs,* OECD Publishing, Paris.

OECD (2013), "Exploring the Economics of Personal Data: A Survey of Methodologies for Measuring Monetary Value", in *OECD Digital Economy Papers*, n°220, OECD Publishing, Paris.

OECD, (2018), “Tax challenges arising from digitalisation”. Interim Report 2018: Inclusive Framework. BEPS, OECD/G20, OECD Publishing, Paris.

OECD, (2019), “Addressing the tax challenges of the digitalization of the economy”. Public Consultation Document BEPS, OECD/G20, OECD Publishing, Paris.

OECD (2019), “Corporate Tax Statistics – First edition”, OECD Publishing, Paris.

OECD (2019), “OECD invites public input on the Secretariat proposal for a unified approach under Pillar One”, OECD Publishing, Paris.

OECD, (2020), “Permanent establishment status”. BEPS, OECD/G20, OECD Publishing, Paris.

Olbert M., Spengel C., (2017), “International taxation in the digital economy : challenge accepted”, in *World Tax Journal*, 9(1), pp.3-46.

Olbert M., Spengel C., (2019), “Taxation in the Digital Economy - Recent Policy Developments and the Question of Value Creation”, in *ZEW-Centre for European Economic Research Discussion Paper* (19-010).

Patterson B., Serrano A.M., (1998), “Tax competition in the European Union”, Office for Official Publ. of the European Communities.

Prat A., Valletti T. M., (2019), "Attention oligopoly", *Available at SSRN 3197930*.

Rochet J. C., and Tirole J. (2003), "Platform competition in two-sided markets", in *Journal of the european economic association*, 1(4), pp. 990-1029.

Rosting H., (1923), "Protection of Minorities by the League of Nations", in *Am. J. Int'l L.*, 17, 641.

Rust R. T., Huang M. H., (2014), "The service revolution and the transformation of marketing science", in *Marketing Science*, 33(2), pp. 206-221.

Saint-Amans P., (2017), "Tax challenges, disruption and the digital economy", in *OECD Observer*, OECD Centre for Tax Policy and Administration.

Schilling M. A., (2002), "Technology Success and Failure in Winner-Take-All Markets: The Impact of Learning Orientation, Timing, and Network Externalities", in *Academy of Management Journal*, 45(2), pp. 387-398.

Schmidt F., Spengel C., (2017), "Digital Tax Index 2017: Locational Tax Attractiveness for Digital Business Models", in *Digital Tax Index 2018,* Centre for European Economic Research (ZEW), University of Mannheim.

Schumpeter J.A., (1942), *Capitalism, Socialism and Democracy,* Harper & Row, New York.

Shigeki M., (2019), "How Should the Digital Economy Be Taxed? ", in *Nippon.com*.

Solomon S.D., (2016), "Tech Giants Gobble Start-Ups in an Antitrust Blind Spot", in *The New York Times,* 16.

Sørensen P.B., (2004), "Company tax reform in the European Union", in *International Tax and Public Finance* 11(1), pp. 91-115.

Spiekermann S., Böhme R., Acquisti A., Hui K.L., (2015), "Personal data markets", in *Electronic Markets* 25(2), pp. 91–93.

Steinfeld N., (2015), "Trading with privacy: the price of personal information", in *Online Information Review*.

Steinfield C., Bouwman H., Adelaar T., (2002), "The dynamics of click-and-mortar electronic commerce: Opportunities and management strategies" in *International Journal of Electronic Commerce*, 7(1), pp. 93-119.

Swenson D.L., (2001), "Tax reforms and evidence of transfer pricing", in *National Tax Journal,* pp. 7-25.

Szczepanski M., (2018), "Corporate taxation of a significant digital presence", in EPRS – European Parliamentary Research Service, PE 623.571, European Parliament.

Timmers P., (1998), "Business models for electronic markets", in *Electronic markets*, 8(2), pp. 3-8.

Trabucchi D., Buganza T., Pellizzoni E., (2017), "Give Away Your Digital Services: Leveraging Big Data to Capture Value", in *Research-Technology Management,* 60(2), pp. 43-52.

Vallespinos M.G., (2020), "Can the WTO Stop the Race to the Bottom? Tax Competition and the WTO", in *Virginia Tax Review*, 40, 93.

Visser J. et al., (2019), "WTS VAT Update for the digital economy", in *WTS Global*, Rotterdam, Netherlands.

Vosoughi S., Roy D., Aral S., (2018), "The spread of true and false news online", in *Science*, 359(6380), pp. 1146-1151.

Wachtel, H., (2003), "Tax Distortion in the Global Economy", *in Global Tensions: Challenges and Opportunities in the World Economy*, pp. 27-43.

Wang Y., Kung L., Byrd T. A., (2018), "Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations", in *Technological Forecasting and Social Change*, 126, pp. 3-13.

Woodruff R. B., (1997), "Customer value: the next source for competitive advantage", in *Journal of the Academy of Marketing Science,* 25(2), pp. 139-153.

Yapar B., Bayrakdar S., Yapar M., (2015), "The role of taxation problems on the development of e-commerce", in *Procedia–Social and Behavioral Sciences,* 195, pp. 642-648.

Annex

This annex presents the financial statements of Facebook, Alphabet (Google) and Amazon for the year 2020.

Figure 25: Facebook financial statement 2019 and 2020[48]

Fourth Quarter and Full Year 2020 Financial Highlights

In millions, except percentages and per share amounts	Three Months Ended December 31, 2020	2019	Year-over-Year % Change	Year Ended December 31, 2020	2019	Year-over-Year % Change
Revenue:						
Advertising	$ 27,187	$ 20,736	31%	$ 84,169	$ 69,655	21%
Other	885	346	156%	1,796	1,042	72%
Total revenue	28,072	21,082	33%	85,965	70,697	22%
Total costs and expenses	15,297	12,224	25%	53,294	46,711	14%
Income from operations	$ 12,775	$ 8,858	44%	$ 32,671	$ 23,986	36%
Operating margin	46%	42%		38%	34%	
Provision for income taxes	$ 1,836	$ 1,820	1%	$ 4,034	$ 6,327	(36)%
Effective tax rate	14%	20%		12%	25%	
Net income	$ 11,219	$ 7,349	53%	$ 29,146	$ 18,485	58%
Diluted earnings per share (EPS)	$ 3.88	$ 2.56	52%	$ 10.09	$ 6.43	57%

Figure 26: Alphabet financial statement 2018, 2019 and 2020[49]

	Quarter		Fiscal Year		
	Q4 2019	Q4 2020	2018	2019	2020
Revenues:					
Google Services	$ 43,198	$ 52,873	$ 130,524	$ 151,825	$ 168,635
Google Cloud	2,614	3,831	5,838	8,918	13,059
Other Bets	172	196	595	659	657
Hedging gains (losses)	91	(2)	(138)	455	176
Total revenues	$ 46,075	$ 56,898	$ 136,819	$ 161,857	$ 182,527

	Quarter		Fiscal Year		
	Q4 2019	Q4 2020	2018	2019	2020
Operating income (loss):					
Google Services	$ 13,488	$ 19,066	$ 43,137	$ 48,999	$ 54,606
Google Cloud	(1,194)	(1,243)	(4,348)	(4,645)	(5,607)
Other Bets	(2,026)	(1,136)	(3,358)	(4,824)	(4,476)
Corporate costs, unallocated[(1)]	(1,002)	(1,036)	(7,907)	(5,299)	(3,299)
Total income from operations	$ 9,266	$ 15,651	$ 27,524	$ 34,231	$ 41,224

(1) Corporate costs, unallocated for fiscal year 2018 includes a fine of $5.1 billion and fiscal year 2019 includes a fine and a legal settlement totaling $2.3 billion.

[48] Source: Facebook (2021), "Facebook Reports Fourth Quarter and Full Year 2020 Results"
[49] Source: Alphabet (2021), "Alphabet Announces Fourth Quarter and Fiscal Year 2020 Results"

Figure 27: Alphabet revenues 2019 and 2020[50]

	Quarter Ended December 31,	
	2019	2020
Google Search & other	$ 27,185	$ 31,903
YouTube ads	4,717	6,885
Google Network Members' properties	6,032	7,411
Google advertising	37,934	46,199
Google other	5,264	6,674
Google Services total	43,198	52,873
Google Cloud	2,614	3,831
Other Bets	172	196
Hedging gains (losses)	91	(2)
Total revenues	$ 46,075	$ 56,898
Total TAC	$ 8,501	$ 10,466
Number of employees	118,899	135,301

Figure 28: Amazon financial statement 2016, 2017, 2018, 2019 and 2020[51]

	Year Ended December 31,				
	2016	2017 (1)	2018	2019	2020
	(in millions, except per share data)				
Statements of Operations:					
Net sales	$ 135,987	$ 177,866	$ 232,887	$ 280,522	$ 386,064
Operating income	$ 4,186	$ 4,106	$ 12,421	$ 14,541	$ 22,899
Net income (loss)	$ 2,371	$ 3,033	$ 10,073	$ 11,588	$ 21,331
Basic earnings per share (2)	$ 5.01	$ 6.32	$ 20.68	$ 23.46	$ 42.64
Diluted earnings per share (2)	$ 4.90	$ 6.15	$ 20.14	$ 23.01	$ 41.83
Weighted-average shares used in computation of earnings per share:					
Basic	474	480	487	494	500
Diluted	484	493	500	504	510
Statements of Cash Flows:					
Net cash provided by (used in) operating activities (3)	$ 17,203	$ 18,365	$ 30,723	$ 38,514	$ 66,064

	December 31,				
	2016	2017	2018	2019 (4)	2020
	(in millions)				
Balance Sheets:					
Total assets	$ 83,402	$ 131,310	$ 162,648	$ 225,248	$ 321,195
Total long-term obligations	$ 20,301	$ 45,718	$ 50,708	$ 75,376	$ 101,406

[50] Source: Alphabet (2021), "Alphabet Announces Fourth Quarter and Fiscal Year 2020 Results"
[51] Source: Amazon (2020), "Annual Report"