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Corso di Laurea Magistrale in International Economics and Commerce

BLOCKCHAIN AS A TOOL TO LOWER THE
SOCIAL COST OF TAX AVOIDANCE

BLOCKCHAIN COME STRUMENTO PER
RIDURRE IL COSTO
SOCIALE DELL'ELUSIONE FISCALE

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Anno Accademico 2019- 2020

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INTRODUCTION

In a commercial context with fewer and fewer boundaries, which gives the consumer the opportunity to access goods and services from all over the world, the role of multinational companies becomes increasingly important. The ability of multinational companies to exploit economies of scale gives them a considerable advantage when compared to smaller national firms. What makes competition more unbalanced is a phenomenon that is often overlooked: the distortion deriving from aggressive tax planning that multinational companies can exploit, thanks to the transnational nature of the structure that distinguishes them.

National tax authorities play an essential role in the described framework. Without the complicity of some States, the phenomenon of tax avoidance would in fact be reduced, or even non-existent. The States in question tend to offer lower and lower corporate tax rates in order to attract companies within their borders. This phenomenon triggers a competition between States that benefits multinational firms, the only ones that can exploit such low rates, at the expense of the community.

In addition to the influence that tax avoidance has on corporate competition, the impact it is having on society cannot be ignored either. Taxes are in fact the lifeblood of modern society: all the individuals being part of a community should respect their duties, doing their part to preserve it. Considering the volume of

business that is under the control of multinational companies, their failure to fulfill their tax responsibilities is reflected in substantial losses for world governments.

The purpose of this thesis is to outline the practices characterizing tax avoidance, to analyze the consequences it has on society, with particular concern to the average consumer and to provide a potential configuration of the international tax system, which, through the use of blockchain technology, could significantly limit the impact of tax avoidance.

To achieve the research objective, the author mainly used a qualitative research method, combined with various case studies. The information was gathered from numerous secondary sources, including: specialized books; papers written by the scientific community, mostly taken from electronic databases such as Scopus, ResearchGate, OECD iLibrary and IDEAS; articles from specialized journals, such as Harvard Business Review; reports from some of the leading global consultancy companies, such as Deloitte and PWC, and reports from the European Commission. The work firstly focuses on the practices carried out by multinational companies to reduce their taxable income, describing tax avoidance and the methods mostly used to practice it. Attention then shifts to the difficulties faced by global tax authorities while trying to tackle these practices perpetrated by multinational firms.

An issue that is addressed with particular attention is the one concerning the social cost that derives from tax avoidance, with the commitment to clearly outline what

are the costs that directly affect citizens, both in purely economic terms and in terms of services. This topic is also explored with the help of some practical examples.

The Apple case relating to taxation in Ireland is carefully analyzed, trying to grasp all the relevant details to address the issue of tax avoidance in the most concrete way possible, bringing the theoretical notions back to a current case.

In the following sections, the work focuses on potential solutions to address the tax avoidance carried out by multinational companies. Therefore, starting from how much these practices can influence consumers' purchasing choices, especially if the governments are committed in making them more aware, the author tries to propose a system that can collect the data necessary to judge the tax policies of firms.

To collect data related to tax payments by companies operating in more than one state and divide them regionally, while bringing them together in a single international database, a system based on blockchain technology could be used. After having reported all the fundamental characteristics of blockchain and having explained its basic operating principles, a potential configuration of the technology in question is described, in order to play the roles necessary to tackle the fight against tax avoidance.

Although blockchain technology plays a fundamental role in the hypothesized system, it has not got the characteristics necessary to convey to the average consumer the meaning and value of the data that is collected. For this reason, a fiscal responsibility index is formulated. This index would play a fundamental role

in communicating to the consumer, in an objective and transparent way, how responsible a multinational company is, in relation to the fiscal policies it adopts. The paper then shifts the focus to what could be the difficulties in adopting the system, focusing on the potential opposition by States and multinational firms and on the measures that could help overcome the difficulties described.

INTRODUZIONE

In un contesto commerciale con sempre meno confini, che da la possibilità al consumatore di accedere a beni e servizi provenienti da tutto il mondo, il ruolo delle compagnie multinazionali diventa sempre più rilevante. La capacità delle società multinazionali di sfruttare l'economia di scala da loro un notevole vantaggio se comparate alle più piccole aziende nazionali. A rendere la competizione maggiormente sbilanciata è un fenomeno che viene spesso trascurato: la distorsione derivante dalla pianificazione fiscale aggressiva che le imprese multinazionali possono sfruttare, grazie alla natura transnazionale della struttura che le contraddistingue.

Le autorità fiscali nazionali hanno un ruolo essenziale nel quadro descritto. Senza la complicità di alcuni Stati, il fenomeno dell'elusione fiscale sarebbe infatti ridotto, se non inesistente. Gli Stati in questione tendono ad offrire aliquote di imposta societarie sempre più basse, al fine di attirare le aziende sul proprio territorio. Questo fenomeno va ad innescare una competizione tra Stati che avvantaggia le compagnie multinazionali, le uniche che possono beneficiare di aliquote così basse, a spese della collettività.

Oltre all'impatto che l'elusione fiscale ha sulla competizione aziendale, non si può quindi trascurare quello che ha sulla società. Le tasse sono infatti la linfa vitale della società moderna: sarebbe dovere di ogni individuo che ne è parte dare il proprio

contributo. Considerando il volume di affari che è sotto il controllo delle compagnie multinazionali, il non adempimento delle proprie responsabilità fiscali si riflette in perdite consistenti per i governi mondiali.

Lo scopo di questa tesi è di delineare le pratiche alla base dell'elusione fiscale, di analizzarne le conseguenze sulla società, con particolare attenzione al consumatore medio e di fornire una potenziale configurazione del sistema tributario internazionale, che, tramite l'utilizzo della tecnologia blockchain, potrebbe andare a limitare notevolmente l'impatto dell'elusione fiscale.

Per raggiungere l'obiettivo della ricerca, l'autore ha adoperato principalmente un metodo di ricerca di tipo qualitativo, combinato a vari casi studio. Le informazioni sono state raccolte da numerose fonti secondarie, tra cui: libri specializzati; paper scritti dalla comunità scientifica, per la maggior parte presi da database elettronici come Scopus, ResearchGate, OECD iLibrary e IDEAS; articoli di riviste specializzate, come Harvard Business Review; report di alcune delle principali aziende di consulenza a livello globale, quali Deloitte e PWC, e relazioni della Commissione Europea.

Il lavoro in principio si focalizza sulle pratiche portate avanti dalle imprese multinazionali per ridurre il proprio imponibile, descrivendo l'elusione fiscale ed i metodi maggiormente utilizzati per praticarla. Successivamente si sposta l'attenzione sulle difficoltà affrontate dalle autorità fiscali globali nel tentativo di fronteggiare queste pratiche perpetrate dalle compagnie multinazionali.

Un tema che viene affrontato con particolare attenzione è quello riguardante il costo sociale che deriva dall'elusione fiscale, con l'impegno di delineare chiaramente quali siano i costi che vanno a gravare direttamente sui cittadini, sia in termini prettamente economici che in termini di servizi. Questo tema viene approfondito anche grazie all'ausilio di alcuni esempi pratici.

Viene analizzato con cura il caso Apple relativo alla tassazione in Irlanda, cercando di cogliere tutti i dettagli rilevanti per affrontare il tema dell'elusione fiscale in maniera il più possibile concreta, riportando le nozioni teoriche su un caso attuale. Nelle sezioni successive il lavoro va a focalizzarsi su quelle che potrebbero essere delle soluzioni per affrontare l'elusione fiscale portata avanti da parte delle imprese multinazionali. Partendo quindi da quanto queste pratiche possano influenzare le scelte di acquisto dei consumatori, specialmente nel caso in cui i governi dovessero impegnarsi per renderli maggiormente consapevoli, si cerca di proporre un sistema che possa raccogliere i dati necessari a giudicare le politiche fiscali delle aziende. Per raccogliere i dati relativi ai pagamenti delle imposte da parte di società operanti in più di uno Stato e suddividerli in maniera regionale, pur riunendoli in un database internazionale unico, si fa affidamento su un sistema basato sulla tecnologia blockchain. Dopo aver riportato tutte quelle che sono le caratteristiche fondamentali della blockchain ed averne spiegato i principi base di funzionamento, viene descritta una potenziale configurazione della tecnologia in questione per poter svolgere i ruoli necessari ad affrontare la lotta all'elusione fiscale.

Sebbene la tecnologia blockchain abbia un ruolo fondamentale nel sistema ipotizzato, non ha però le caratteristiche necessarie a trasmettere al consumatore medio il significato ed il valore dei dati che vengono raccolti. Per questo viene formulato un indice di responsabilità fiscale. Questo indice avrebbe un ruolo fondamentale per comunicare al consumatore, in maniera oggettiva e trasparente, quanto una società multinazionale sia responsabile relativamente alle politiche fiscali che adotta.

L'elaborato sposta poi l'attenzione su quelle che potrebbero essere le difficoltà nell'adozione del sistema, soffermandosi sulle potenziali opposizioni da parte degli Stati e delle società multinazionali e sulle misure che potrebbero aiutare a superare le difficoltà descritte.

1. TAX AVOIDANCE

1.1. DEFINITION OF TAX AVOIDANCE

When it comes to tax avoidance, the attention should be focused on the difference between the concept of tax avoidance and the one of tax evasion.

The Organization for Economic Co-operation and Development (OECD) defines avoidance as “the arrangement of a taxpayer’s affairs that is intended to reduce his tax liability and that although the arrangement could be strictly legal it is usually in contradiction with the intent of the law it purports to follow” and evasion as “illegal arrangements where liability to tax is hidden or ignored”. Therefore, the main difference between the two concepts is that, meanwhile tax avoidance can be perfectly legal, tax evasion is always against law. On the other hand, both tax avoidance and tax evasion share the same purpose: maximize the income of the firm either by not paying taxes at all or by paying a smaller amount than the required one.

To minimize the tax liability and to increase the after-tax rate of return to investors, firms act through Effective Tax planning. Tax planning is part of companies’ strategic policies, but when it turns into aggressive tax planning, it strongly affects the society in a negative way.

A research paper of the European Parliament of 2015 estimates the loss of tax revenue to the European Union (EU) Member States, due to aggressive corporate tax planning, to be around 160-190 billion euros per year. Such loss of tax revenue brings about a sharp decrease in the amount of available funds to be invested in services and infrastructure, which are crucial for the wellbeing of the EU citizens. In order to address aggressive tax planning, the OECD developed the Action Plan on Base Erosion and Profit Shifting (BEPS), which refers to tax planning strategies used by multinational enterprises that exploit gaps and mismatches in tax rules to avoid paying tax. Three are the pillars on which the Action Plan is based: substance, coherence and transparency. Furthermore, it contains fifteen actions meant to address tax avoidance practices (Van de Vijver et al., 2020).

A complex aspect to address is to define the boundaries of aggressive tax planning. The European commission describes aggressive tax planning as “taking advantage of the technicalities of a tax system or of mismatches between two or more tax systems for the purpose of reducing tax liability”.

Nevertheless, while theoretically it is pretty easy to draw a separation line between acceptable and aggressive tax planning, in reality it is a very complex task and the limits are extremely blurred.

1.2. THE MOST USED METHODS TO ELUDE

The main channels through which aggressive tax planning is usually performed by multinational companies are: via interest payments, via royalty payments and via strategic transfer pricing.

1.2.1. Tax Residence

Some of the most common structures of Income shifting through interest payments are represented by the offshore loan structure and the corresponding financing via offshore structures, the hybrid loan structures, the hybrid entity structure and the interest free loan structure.

All these structures are aimed at reducing the tax base in the target entity through interest deduction. The target entity is a firm within a multinational group where the tax base is reduced, so it is usually located in countries with high tax rates. Exploiting the legal mismatch in the treatment of the interest payment between the target and the receiving entity and the fact that interest costs are usually deductible from the tax base, the financial flow is either exempted from taxation or taxed at a lower rate.

1.2.2. Timing of taxation

The aggressive tax planning channel based on the income shifting through royalty payments aims at reducing the tax base in the target entity by deducting the royalty costs. In this case, the tax saving takes place thanks to the exploitation of a lower tax entity. A lower tax entity is a firm within a multinational group where the tax base is increased and taxed at lower rate. The reason for this lower taxation on the royalty received is to be found either on a lower corporate tax rate or into a specific regime.

1.2.3. Transfer pricing

Another way of doing aggressive tax planning is through strategic transfer pricing for internal transactions of goods and services. Essentially, this technique is based on a distortion of the prices for the intra-firm transactions, meant to shift the profits of a multinational company into firms or subsidiaries, that are part of the same group, in such a way that the profit is shown where the tax rates are lower and so, more favorable.

Table 1.1. The most used methods to elude

ATP Channel	Economic mechanisms at work	ATP Study
Tax planning via interest payments	Interest costs are deducted in target entity and not taxed/taxed at zero rate in offshore entity.	Offshore loan
	Interest costs are deducted in target entity and taxed at a lower rate in lower tax entity.	n.a.
	Interest costs are deducted in target entity and treated as divided income (and exempted) in other entity.	Hybrid loan
	Interest costs are deducted in target entity, while interest cancels out because target entity is transparent for other entity.	Hybrid entity
	Deemed interest costs are deducted in target entity, while no interest is paid/received by other entities.	Interest-free loan
Tax planning via royalty payments	Royalty costs are deducted in target entity and not taxed/taxed at zero rate in offshore entity.	n.a.
	Royalty costs are deducted in target entity and taxed at a reduced rate in patent box entity.	Patent box
	Royalty costs are deducted in target entity and taxed at a reduced rate in lower tax entity.	n.a.
	Royalty costs are deducted in target entity and royalty income is not taxed in receiving entity which is legal but not tax resident.	Two-tiered IP
	Royalty costs are deducted in target entity, and income arises in tax free entity.	IP and cost contribution agreement
Strategic transfer pricing of goods and services	Prices for intra-firm transactions are distorted to increase profits in lower tax entity at the expense of higher tax entities	n.a.

Source: European Commission, *Aggressive tax planning indicators - Final Report (TAXUD/2016/DE/319)*, 2017

As it can be noticed from Table 1.1., what links all the successful aggressive tax planning strategies is the fact that they are developed in such a way to lower the consolidated tax burden for the multinational group overall.

According to this, an important symptom of aggressive tax planning being carried on, is the occurrence of a lower effective tax rate in the consolidated account of a multinational company, compared to the one of the similar domestic companies.

It is crucial to bear in mind that a lower effective tax burden is not always to be connected to aggressive tax planning, nevertheless there are other signals that have to be sought. An important one is the presence of a large gap in the consolidated accounts between operating and pre-tax profitability.

A fundamental boundary for aggressive tax planning is the presence of controlled foreign corporation (CFC) rules. Indeed, the majority of the practices that have been described up until now, include an intra-firm transaction to move the taxable income into a lower or zero tax rate country. If the country where the firm is headquartered has binding and effective CFC rules, all the aggressive tax planning practices would not be effective, as the foreign income would be included in the headquarter tax base. Consequently, another criterion to identify multinational companies practicing aggressive tax planning is represented by the location of the headquarter in countries with no CFC rules.

On the grounds of what has been described so far, it comes by itself that the multinational company needs to have a subsidiary in a zero or, at least, a lower tax

country. Financial transactions will relocate the corporate tax base of the company in these countries in order to have a higher profitability in the offshore entity and a lower one in the target entity.

Another evidence that companies are exploiting the income shifting through the interest payments channel can also be given by a higher debt share and high interest payments. On the other hand, when companies are exploiting the income shifting through the royalty payments channel the presence of more intangible assets and patents in the lower tax entity will be noticed.

In order to identify a company practicing aggressive tax planning through strategic transfer pricing, it can be useful to look for distorted import prices for internal transactions. Indeed, this structure aims at shifting profits between subsidiaries mispricing the transactions. In this case, it is usually very hard to identify the wrongdoing, as companies are underestimating intangible goods, whose value cannot be easily determined (European Commission, 2017).

1.3. DIFFICULTIES DERIVING FROM THE DIFFERENT SPEEDS BETWEEN ECONOMY AND LEGISLATION

In addition to the direct loss of tax revenues for the affected country, aggressive tax planning implies a wide range of several economic consequences. Indeed, it is important to consider also the distortion created in the playing field between

companies practicing aggressive tax planning and organizations that do not, such as small national firms that are competing in the same industry, but with different rules if compared to big multinational corporations.

Corporations benefit from a huge reduction in the effective taxation, allowing them to gain market shares by lowering prices and to rise entry barriers to other firms. Another consequence is a negative impact on taxpayers' morale, pushing them to stop complying their own tax obligation.

Even though international organizations have taken several countermeasures to address aggressive tax planning, such as the Action Plan developed by the OECD and the EU regulations meant to promote transparency, firms apparently did not change their attitude and their tax behavior: aggressive tax planning is still a very common practice.

The reason why stopping companies from carrying on this practice is so intricate, has to be found in different aspects of the environment where it takes place.

First of all, it is important to consider the amount of money invested by multinational companies to develop proper strategies to lower the taxable income. Indeed, also a small reduction in the percentage of the taxable income for a multinational company, taking into account the enormous revenues made, reflects in a huge increase in the profits for the investors.

Furthermore, even though there is the possibility for the company to be found guilty of aggressive tax planning, the times needed to prove so and to determine the sum

that needs to be refunded to the affected state are very long. This means that for this time frame the company will benefit from more money to invest and will picture itself as more solid and reliable.

Another aspect that has to be taken into account is that, as already mentioned, tax avoidance is totally legal and the biggest risk companies are incurring in, is to be fined and to be pushed to give back the amount of taxes that have not been paid. The tax managers of multinational corporations are able to put in place such practices because they are usually playing in fields where the rules have not been settled yet, therefore exploiting their capacity to play in advance.

This is made possible because of the different speeds at which economy and law are proceeding. Economy is moving much faster compared to law and what occurs as a consequence from this is a chase similar to a cat and mouse game, where the cat is blindfolded (European Commission, 2017).

1.4. WHY DO NOT SOME STATES STAND OPPOSIT?

As already mentioned, to make aggressive tax planning and tax avoidance possible, an essential requirement is represented by the presence of a lower tax entity, therefore, there must exist a state with a lower corporate tax rate compared to the others. Taking into consideration that the most affected entities, by the described practices, are States and their capacity to provide services, the reader could draw

attention to one crucial question: “Why do States allow these practices by lowering their corporate tax rate?”.

The answer is not so obvious but is easy to understand. Sometimes setting lower tax rates is a useful tool used by countries in order to compensate for the disadvantages coming from high cost of labor: as shown by the study carried out by Rincke and Mittermaier in 2013, a one dollar increase in the labor cost of a country involves, on average, a reduction of the corporate income tax rate of one percent. Nonetheless, what is really taking place among countries now is a competition aimed at attracting multinational companies on their soil. Such competition is a race to accommodate multinational enterprises’ needs, mainly through the reduction of their corporate taxation and by deliberately non-obstructing tax avoidance practices.

Analyzing this phenomenon from a single country point of view, even though tax competition leads to corporate tax rates that are inefficiently low, it also involves a shifting of capitals from higher to lower tax rates systems. Thus, what for a country represents an outflow of capital, for another nation is an inflow of capital, and consequently a positive fiscal externality.

In particular, Beer S. Mooij R. and Liu L. (2018), in their studies estimated the benefit for the countries switching to a lower corporate rate. A meta-analysis of the extensive literature showed that a 1 percentage-point lower corporate tax rate will expand the before-tax income by 1%.

To a certain extent, some low corporate tax rate countries, that usually are referred to as “tax havens”, are acting as “parasitic” with the revenues of the non-haven countries (Wilson, 2014). Furthermore, non-haven countries are led to invest resources in order to defend their revenue base. This definitely brings about a reduction of the capability of the affected countries to implement welfare policies for their citizens (Slemrod and Wilson, 2009).

Even though these practices benefit some countries, it comes by itself that the collective well-being is affected. Indeed, this competition is constantly reducing the overall taxation of corporations.

What is happening in Europe really helps in understanding the global situation. States are formally increasing their commitment in fighting avoidance, but the system is allowing behaviors that are contradictory. The lack of a common interstate policy is mining the attempts to solve the problem. To address the situation, the European Commission promoted the Common Consolidated Corporate Tax Base (CCCTB), a single set of rules to calculate companies’ taxable profits in the EU. By checking the literature, the first idea of the CCCTB has to be found in 2001 and the commission proposed the adoption of the CCCTB for the first time back in 2011, when it had been addressed as too ambitious by some member States that stalled the proposal. In October 2016, the commission re-launched the CCCTB, in a simplified version, with a two-stage implementation plan and aiming at making MNEs pay a share of taxes proportionate to where they are generating profits.

Nonetheless, the CCCTB is still on the negotiating table as member States are not unanimously agreeing on the future of common corporate taxation.

One of the main unresolved issues of the CCCTB is the matter of the sovereignty and the legitimacy of the member states that do not want to lose their power of making their own fiscal policies. Considering the challenges and the obstacles that a political and economic union of states, such as the European Union, is facing to reach an agreement, it is easy to understand why doing so is very hard either for the OECD members or for the overall society.

2. THE SOCIAL COST OF TAX AVOIDANCE

2.1. DEFINITION OF SOCIAL COST

Not only does aggressive tax planning have negative implications for small national firms operating in the same industry of multinational corporations, but it also unfavorably impacts the overall society, the institutions and governance strength. The capability of governments to provide services and essential infrastructures to their citizens is bounded to their resources.

Especially, when it comes to countries' revenues, corporate income taxes are one of the most important sources of income. Tax revenues are the lifeblood of social development, a vehicle for pursuing important social objectives, such as the reduction of poverty and inequality, which are crucial to finance and sustain the pillars of the modern state, such as education, health care and the legal system. F.D. Roosevelt used the following words to describe what the real essence of taxes is: "taxes, after all, are the dues that we pay for the privileges of membership in an organized society".

According to existing cross-country studies, those multinational companies, that are structured to perpetrate tax avoidance in the jurisdictions in which they operate, are responsible for an annual global revenue loss between 100 and 650 billion dollars.

Such annual global loss is affecting citizens from all over the world in more than one extent. First of all, it is one of the causes of the lack of services that some countries are facing.

Furthermore, together with the fall in revenues caused by tax avoidance, the last decades trend shows a decline in national corporate tax rates. This loss has been replaced by governments by rising other taxes that are hitting less mobile capital, labor consumption and savings. To some extent, tax avoidance practices are contributing to widen social inequalities, enhancing private gains of a small elite composed by the shareholders of the MNEs, at the expense of the rest of the taxpayers.

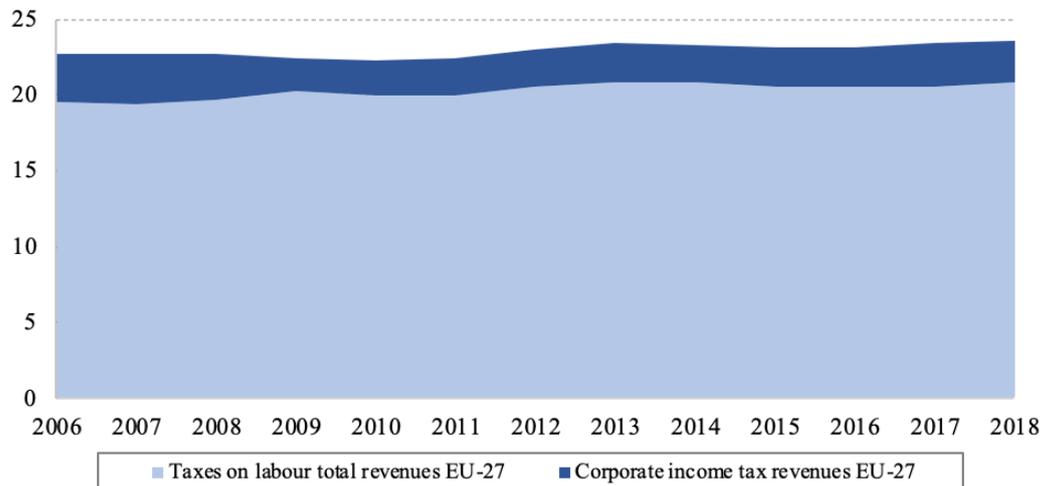
Analyzing what is happening to the distribution of the tax burden from a long-term perspective, it is possible to notice the presence of a huge shift of the trend.

According to Christensen and Murphy (2004), in the United States in 1953, families and individuals paid 59 percent of federal revenues, whereas big corporations were responsible for only 41 percent of the total amount. The situation dramatically changed at the beginning of the 21st century, when such a ratio shifted around 80:20.

With regard to Europe, analyzing the Eurostat data on tax rates and tax revenues of the period 2006-2018, the trend that international taxation is following is clear.

The ratio of the tax burden is described in the following graph, underlining the difference in terms of contribution between multinational corporations and the labor force.

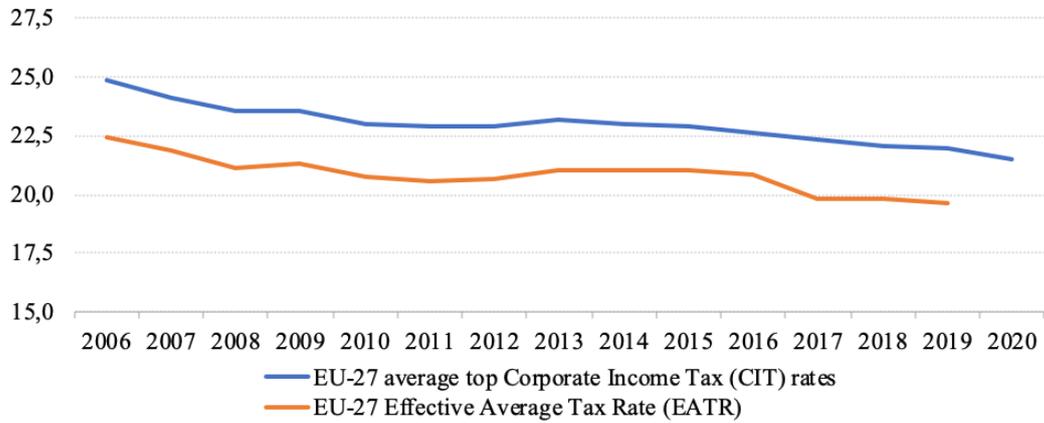
Graph 2.1. Tax revenues contribution ratio: MNEs vs. Labor force (% of GDP)



Source: European Commission, DG Taxation and Customs Union, based on Eurostat data.

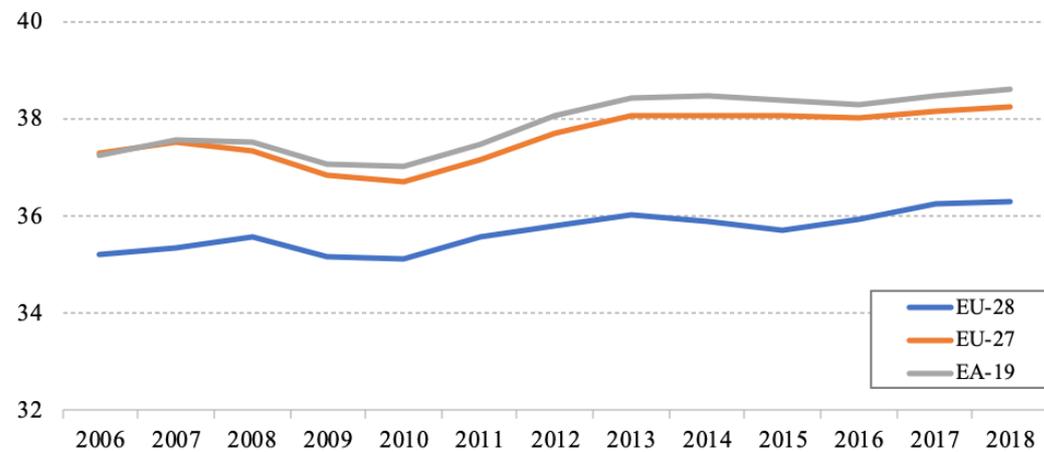
Tax avoidance and tax competition among States caused both a reduction of corporate income tax rates (Graph 2.2.) and an increase of the implicit tax rate on labor (Graph 2.3.).

Graph 2.2. Corporate income tax rates and average effective taxation indicators %



Source: European Commission, DG Taxation and Customs Union, based on Eurostat data.

Graph 2.3. Implicit tax rate on labor %



Source: European Commission, DG Taxation and Customs Union, based on Eurostat data.

Moreover, it cannot be ignored the distortion in the competition coming from the tax advantages that multinational companies can benefit from. Therefore, in a competitive environment, multinational companies' competitors, either nationally

or locally based, will always race on an uneven field, regardless of whether they can be better performing in terms of innovation or efficiency. Such a distortion affects the liberal global trade model, that is also influenced by the fact that transnational companies' investment decisions are mainly driven by the fiscal topography, thus no longer following the Ricardian doctrine of comparative advantages.

Through their strategic allocation of profits, multinational companies have the power to shift the wealth across countries. On the one hand, such practices deprive millions of people of clean water, sanitation, education, healthcare, pensions, security, transport and public goods, and, on the other hand, they are guilty of provoking a sharp increase of income disparities between nation states.

2.2. APPLE CASE

In order to better understand the dynamics and the scale of the phenomenon, an example is provided in the following lines.

One of the most controversial cases of the 21st century has been the one of Apple's Irish subsidiaries. Among the OECD countries, Ireland is the third for the lower

corporate income tax rate (12.5%), following Switzerland (8.5%) and Hungary (9%)¹.

Beside this, Ireland incorporated companies can also benefit from all the advantages coming from operating in a member State of the European Union. Furthermore, as it is going to be detailed, in order to result even more attractive for big corporations, Ireland reached deals with multinational companies to allow them to pay even lower rates. This “flexibility” shown by the country had the desired effect, pushing many multinational companies to choose Ireland as the preferred country where they want to pay their taxes.

Followed by several well-known multinational companies, such as Google², Facebook, General Electric, Johnson & Johnson, Starbucks³, Airbnb⁴, IBM⁵,

¹ https://stats.oecd.org/index.aspx?DataSetCode=Table_III#, URL visited on 20/05/2020

² <https://www.irishtimes.com/business/economy/double-irish-and-dutch-sandwich-saved-google-3-7bn-in-tax-in-2016-1.3343205>, URL visited on 20/05/2020

³ <https://www.bloomberg.com/news/articles/2010-10-21/google-2-4-rate-shows-how-60-billion-u-s-revenue-lost-to-tax-loopholes>, URL visited on 20/05/2020

⁴ <https://www.bloomberg.com/news/articles/2016-04-06/the-sharing-economy-doesn-t-share-the-wealth>, URL visited on 20/05/2020

⁵ <https://arstechnica.com/information-technology/2014/02/report-ibm-gooses-its-sales-numbers-thanks-to-overseas-tax-tricks/>, URL visited on 20/05/2020

Microsoft⁶ and Yahoo, Apple Inc.⁷ was the first to start to exploit the advantages offered by the Irish tax system.

2.2.1. Apple's organizational structure

Apple organizes its sales by dividing them between two regions since 1980. Apple Inc. in the United States is responsible for coordinating sales for the North and South America. Apple's Irish affiliate - Apple Sales International (ASI) is responsible for selling Apple's products to Europe, the Middle East, Africa, India, Asia and the Pacific. Apple divides its economic intellectual property rights along these same lines. The legal rights over Apple's intellectual property are totally owned by Apple Inc. Through a cost-sharing arrangement, Apple Inc. owns the economic rights to Apple's intellectual property for goods sold in the Americas, while the economic rights to intellectual property for the sales in Europe, the Middle East, Africa, India, and Asia are owned by Apple Sales International (ASI) and its parent, Apple Operations Europe Inc. (AOE). According to Apple, this cost sharing-

⁶ [https://www.taxjustice.net/cms/upload/pdf/WSJ - Microsoft slashes taxes in US and EU through Irish subsidiary - 7 NOV 2005.pdf](https://www.taxjustice.net/cms/upload/pdf/WSJ_-_Microsoft_slashes_taxes_in_US_and_EU_through_Irish_subsidiary_-_7_NOV_2005.pdf), URL visited on 20/05/2020

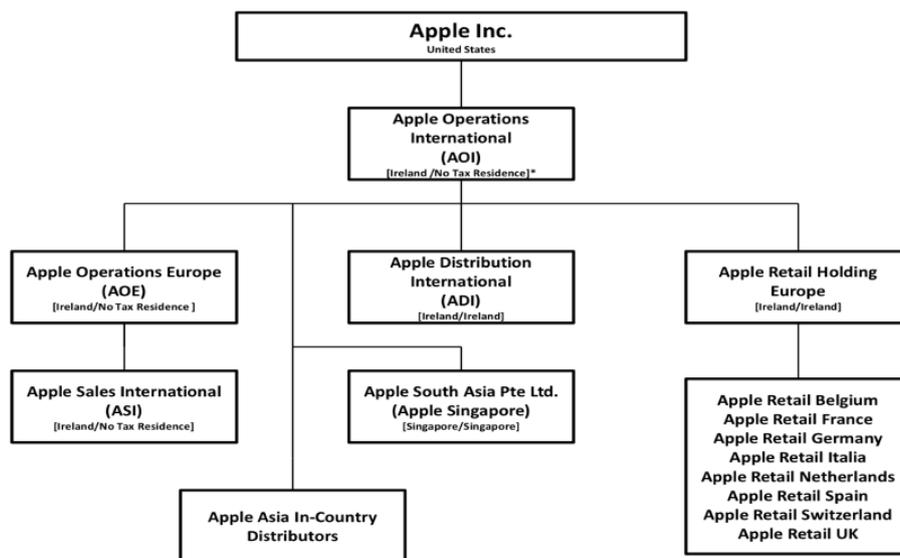
⁷ <https://www.nytimes.com/2017/11/06/world/apple-taxes-jersey.html>, URL visited on 20/05/2020

arrangement enables the company to produce and distribute products around the world.

To conduct its offshore operations Apple Inc., rely on a network of offshore affiliates.

The key companies at the top of the offshore network are incorporated and located in Ireland at the same address in Cork. Apple’s offshore organizational structure in Ireland is depicted in the following chart:

Graph 2.4. Apple’s Offshore Organizational Structure



*Listed countries indicate country of incorporation and country of tax residence, respectively.

Source: Materials received from Apple Inc. and prepared by the Permanent Subcommittee on Investigations, 2013.

2.2.2. Deferral, transfer pricing and check the box

The company designed its business to locate as much income as possible in the low tax entity, allocating at the same time as many costs as possible to those high-tax jurisdictions where deductions are especially valuable, such as United States. Deduction is of 35% in the U.S. but only one-third as much in Ireland, where, as already mentioned, the corporate tax rate is only 12.5 %. To achieve these twin goals, Apple mostly relied on three specific tools of international tax avoidance: deferral, transfer pricing, and check-the-box.

Deferral allows U.S. firms to avoid paying U.S. tax on foreign income until earnings are brought back home.

Through transfer pricing the firm used internal bookkeeping to allocate expenses among various affiliates. For a company like Apple, nearly all the value of its products is in its patents and other intellectual property. By charging a relative low amount to a foreign subsidiary for use of that IP, it can maximize that affiliate's profit and minimize its IP income in the U.S.

Check-the-box originally aimed at simplifying filing, the US Treasury's rules allow firms to classify themselves as one of several different entities such as corporations, partnerships and similar. However, a firm can exploit these rules to be classified as a "disregarded entity". A disregarded entity is an affiliate that is not subject to U.S. income tax.

To prevent the abuse of deferral, firms might be subject to Subpart F, that are specific rules to avoid this eventuality. But multinationals avoid these restrictions by designating foreign corporations they control as disregarded for tax purposes, thanks to the check-the-box regulations.

Apple also uses the check-the-box regulations to avoid U.S. taxation of a second type offshore income. The income received by an offshore subsidiary of a multinational corporation in the form of dividends, royalties or other fees from a related subsidiary, is considered foreign personal holding company (FPHC) income. That passive income, as it is commonly known, is normally subject to immediate taxation under Section 954(c) of Subpart F. Nevertheless, under check-the-box rules, if a U.S. multinational elects to have lower-tier subsidiaries “disregarded” and treated as part of an upper-tier subsidiary for tax purposes, any passive income paid by the lower-tier subsidiary to the higher-tier parent would essentially disappear. As long as those dividends, royalties and fee payments would be treated as occurring within a single entity, the American Internal Revenue Service (IRS) would not treat them as payments between two legally separate entities or as taxable income under Subpart F.

In Apple’s case, in 2011 alone, AOI in Ireland received 6.4 billion dollars in dividends from lower-tier offshore affiliates. Over a four-year period, from 2009 to 2012, Apple reported that AOI received a total of 29.9 billion dollars in income, almost exclusively from dividends issued to it by lower-tier CFCs (Controlled

Foreign Corporations). That dividend income is exactly the type of passive income that Subpart F intended to be immediately taxable. However, by invoking the check-the-box regulations, Apple Inc. was able to designate the lower-tier CFCs as “disregarded entities”, requiring the IRS to consider them as part of AOI for tax purposes. Once they became part of AOI, their dividend payments became payments internal to AOI and were no longer taxable passive income.

The check-the-box regulations were never intended to be used to convert taxable, offshore, passive income into non-taxable income. Nevertheless, they do, and Apple found the best way to exploit the resulting loopholes.

Under Subpart F, ASI’s income should have been treated as foreign base company sales (FBCS) income subject to U.S. taxation in the year received. Apple used the check-the-box loophole and instead of declaring that income, avoided to pay all U.S. taxation of that FBCS income. The following estimates, provided by Apple, measure the total amount of U.S. taxes on FBCS income that Apple Inc. was able to avoid, with the help of the check-the-box loophole:

Table 2.1. Estimated U.S. Taxes Avoided by Apple Inc. Using Check The Box 2011-2012

	Foreign Base Company Sales Income	Tax Avoided	Tax Avoided Per Day
2011	\$ 10 billion	\$ 3.5 billion	\$ 10 million
2012	\$ 25 billion	\$ 9.0 billion	\$ 25 million
Total	\$ 35 billion	\$ 12.5 billion	\$ 17 million

Source: Information supplied to Subcommittee by Apple, APL-PSI-000386

These figures indicate that, in two years, from 2011 to 2012, Apple Inc. used the check-the-box loophole to avoid paying 12.5 billion dollars in U.S. taxes or about 17 million dollars per day.

2.2.3. Cost sharing agreement

Apple Inc.'s Irish affiliates helped Apple avoid U.S. taxes shielding income from taxation through the utilization of a cost-sharing agreement and related transfer pricing practices. Three key offshore affiliates in this effort are ASI, its parent AOE, and Apple Distribution International (ADI). All the three companies are incorporated and located in Ireland and share the same mailing address.

ASI and AOE have a central role as long as they are parties to a research and development cost-sharing agreement with Apple Inc.

This cost-sharing agreement gives them joint ownership of the economic rights to Apple's intellectual property offshore. Despite ASI and AOE co-participate in the cost-sharing agreement with Apple Inc., the biggest part of Apple's offshore earnings flow to ASI. For simplicity, will be referred to as the cost-sharing agreement as between Apple Inc. and ASI, even though the, from a contractual point of view, it is an agreement between Apple Inc. and both ASI and AOE.

In the cost sharing agreement, Apple Inc. and ASI agree to share in the development of Apple's products and to divide the resulting intellectual property economic

rights. To calculate their respective costs, Apple Inc. first pools the costs of Apple's worldwide research and development efforts. Apple Inc. and ASI then each pay a portion of the pooled costs based upon the portion of product sales that occur in their respective regions.

2.2.4. Offshore distribution structure

ASI contracted with a Chinese third-party manufacturer to assemble the finished goods for the majority of Apple products. Apple Inc.'s employees based in the United States, including an Apple Inc. employee serving as an ASI director, negotiated and signed those contracts on behalf of ASI.

The third-party manufacturer was receiving purchase orders placed by ASI. Afterwards, the initial purchaser of all goods intended to be sold throughout Europe, the Middle East, Africa, India, Asia, and the Pacific region was ASI. After taking the initial title of the finished goods, in most cases without even taking physical possession of the goods, that, therefore, never reached Ireland, ASI resold them to the appropriate distribution entity. For instance, for the European market, ASI sold the finished products to ADI after purchasing them from the third-party manufacturer. ADI then resold the products to Apple's European retail subsidiaries, to third-party resellers, or directly to internet customers.

Regarding the Asian and the Pacific region's market, ASI sold the finished goods to Apple Singapore that re-sold them to Apple retail subsidiaries in Hong Kong, Japan, and Australia, third party resellers, or directly to internet customers.

As previously assessed, even though ASI is the purchaser of the finished goods and is an Irish incorporated entity, only a small percentage of Apple's manufactured products ever entered Ireland. Somewhat, while the title went from the third party manufacturer to the Apple distribution affiliate that took ownership of the goods passing through ASI, the products were being directly shipped to the eventual country of sale. The Apple distribution affiliate then sold the goods to either end customers or Apple retail subsidiaries. Looking at Apple's distribution process, it comes to mind that the choice to locate its affiliates in Ireland was not related to sales or distribution functions they performed. Instead, this choice may be driven by the intention to concentrate offshore profits in a low tax jurisdiction.

2.2.5. Shifting profits offshore

By structuring its intellectual property rights and distribution operations in the manner it did, Apple Inc. was able to avoid having the revenues of its worldwide sales related to its intellectual property attributed to itself in the United States where it would be subject to taxation in the year received. Instead, Apple Inc. managed to attribute to ASI, in Ireland, a large portion of its worldwide sales revenue.

There are various characteristics of the cost-sharing agreement and Apple's research and development (R&D) and sales practices suggesting that it is primarily a practice meant to shift profits offshore to avoid U.S. taxes. First of all, the biggest part of Apple's R&D efforts, that are the source of the intangible value of its products, is carried out in the United States, but nevertheless, under the cost sharing agreement, a disproportionate portion of the resulting profits remains outside of the U.S.. Second, analyzing the way Apple carries out its commercial operations, the transfer to Ireland of intellectual property rights, via the cost-sharing agreement, appears to play no role. At last, the cost-sharing agreement does not shift any risks or benefits away from Apple Inc., it only shifts the location of the tax liability for Apple's profits.

Apple Inc. employees in California conduct almost all of Apple's research activity. Apple's engineers, technical experts and product design specialists, are physically located in California. Only a small number of specialty computers is built by ASI and AOE and they conduct less than 1% of Apple's R&D. In 2011, 95% of Apple's research and development was conducted in the United States, making Apple's arrangement with ASI closer to a cost reimbursement than a co-development relationship. Indeed, it can't be stated that both parties contribute to develop the intrinsic value of the intellectual property.

However, despite the fact that ASI conducts only minimal research and development activity, the cost sharing agreement gives ASI the rights to the

“entrepreneurial investment” profits that result from owning the intellectual property. Over the four-year period, 2009 to 2012, according to Apple ASI made to Apple Inc. approximately 5 billion dollars cost-sharing payments. With an income of 74 billion dollars over those same 3 years, ASI’s resulting income was a ratio of more than 15 to one, when comparing its income to its costs. In few words, ASI profited in amounts far in excess of its R&D contributions and it is clear by analyzing the mismatch that comes out when comparing these results with the ones of Apple Inc. Apple Inc. over the same years paid 4 billion dollars under the cost-sharing agreement and reported profits of 39 billion dollars. Its cost to profits ratio was closer to 7 to one, far less advantageous if compared to the one of ASI. The figures disclose that Apple’s Irish subsidiary, ASI, profited more than twice as much as Apple Inc. itself from the intellectual property that was largely developed in the United States by Apple Inc. personnel. That relative imbalance suggests that the cost-sharing arrangement for Apple Inc. makes little economic sense without the tax effects of directing 74 billion dollars in worldwide sales revenue away from the United States to Ireland, where it undergoes minimal or even no taxation thanks to ASI’s claimed status of non-tax resident.

Apart from its benefits related to tax effects, there is no apparent commercial benefit that justifies Apple’s transfer of the economic rights to its intellectual property to Ireland. So true is it that, even though the company operates in numerous countries around the world, it does not transfer intellectual property rights to each region or

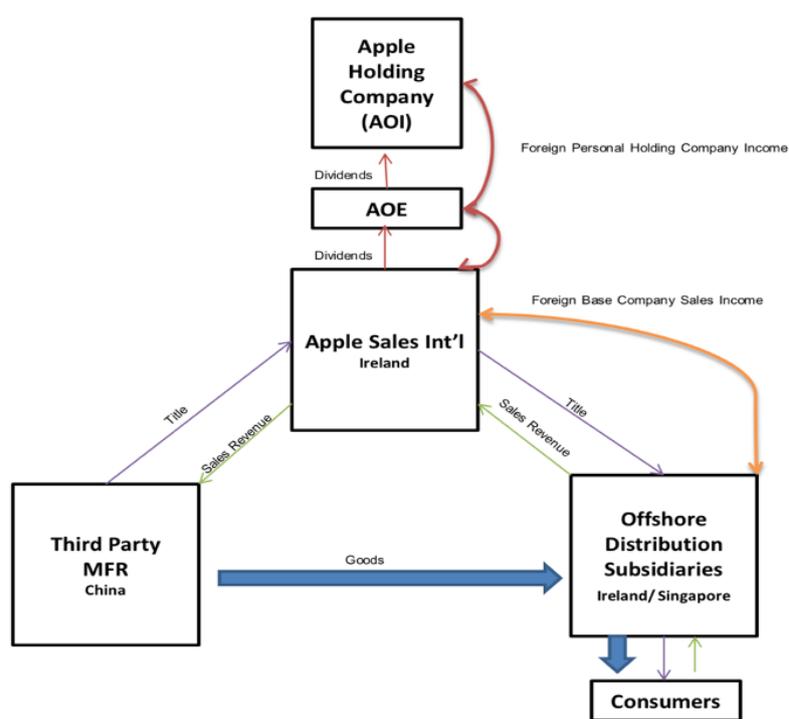
country where it conducts business. Instead, the transfer of economic rights is confined to Ireland alone, where the company enjoys an extremely low tax rate. Also the components used in Apple's finished goods are produced in a variety of countries around the world and there is no regard to where the economic rights to the intellectual property are physically or legally located.

A third-party manufacturer in China assembles most of Apple's finished. Apple's components are sourced globally, and the Apple's executives in Cupertino negotiated the agreement governing Apple's relationship with the third-party manufacturer in China. Which Apple's entity is holding the economic rights or where, does not seem to influence or restrict where or by who the manufacturing work is carried out.

Apple and its offshore subsidiaries share the risks and rewards of the research and sales activities that the corporation performs, no third party independent of Apple is assigned any cost, risk or rewards by the cost-sharing agreement. Apple executives interviewed by the Subcommittee said that priorities and interests of Apple's closely held entities are in line with those of Apple Inc.. Apple's offshore affiliates and Apple Inc. operate as one worldwide enterprise. The cost sharing agreement primarily affects how Apple's R&D costs and sales revenues will be attributed among the affiliates of the international company and in what proportions. What appears to be clear is that Apple entered into an agreement with its own subsidiaries, not to divide research and development costs with an outside

party, but instead to shift its costs and profits in order to take advantage of the fiscal discrepancies between the countries the company operates in.

Graph 2.5. Apple's Offshore Distribution Structure



Source: Prepared by Subcommittee based on interviews with Apple employees

These facts raise questions as to whether Apple's intellectual property transfers to related parties perform any function other than to shift profits and tax liability out of the United States to a low-tax jurisdiction.

2.2.6. Irish and U.S.A. tax residence rules

According to the Article 4 of the OECD Model, a corporation is considered “resident in a contracting State” for tax purposes if it has been registered under the State’s jurisdiction and/or where it has the place of effective management (POEM). In the case of Ireland, the general corporation tax rate is 12.5% but when it deals with Multinational Corporations tax rate is subject to agreements and different sets of rules. For instance, only when an enterprise of one of the Contracting States carries on business through a permanent establishment in the other State its presence is regarded as sufficient to allow that State (Ireland) to tax the business profits attributable to where there is a permanent establishment. A controlled subsidiary or controlling parent does not of itself constitute a permanent establishment of its associated company, unless the activities of the subsidiary or parent fall within the other provisions of the article. It is considered permanent establishment branches, offices, factories, workshops, installations or structures for the exploration and/or extraction of natural resources, buildings, constructions. So, in the case of Ireland, the central management and control rule applies to foreign incorporated companies: if a company is incorporated in a foreign country and is centrally managed and controlled in Ireland, it is resident in Ireland for tax purposes.

For the USA the general corporation tax rate is now equal to 21%, whereas before 2018 it was 35%. According to the USA's rules for tax residence, a company is considered tax resident if the entity has been founded in the territory of the United States. "Generally, a corporation is treated as a domestic corporation if it is created or organized under the laws of the United States, any State, or the District of Columbia. No other criteria related to place of management will cause a corporation to be domestic" (SECTION II United States - Information on residency for tax purposes Corporations).

2.2.7. How Apple exploited different tax residence rules

Apple has exploited the difference between Irish and U.S. tax residency rules. In fact, Ireland uses a management and control test to determine tax residency, while the United States determines tax residency based upon the organization's place of formation. Apple explained that, although AOI is incorporated in Ireland, it is not tax resident in Ireland, because AOI is neither managed nor controlled in Ireland. Apple also stated that AOI was not incorporated in the United States, so AOI is not a U.S. tax resident under U.S. tax law either. ASI is exploiting the same difference between Irish and U.S. tax residency rules as AOI. Despite that, ASI has displayed a corporate tax return related to its operating presence in Ireland. Since the early 90s, the Government of Ireland has provided Apple affiliates with a customized tax

rate that is substantially below its already relatively low statutory rate of 12.5%. The rate has varied from year to year, but since 2003 has been between 2% and 0.05%.

Going more in depth in the case of no tax residence of Apple, we can notice that Apple has established and directed tens of billions of dollars to the Irish affiliates, making AOI its primary offshore holding company, and ASI its primary intellectual property rights recipient. AOI earned 30 billion dollars of income between 2009 and 2012, despite having no employees and no physical presence. Nevertheless, the company is managed and controlled in the United States but has paid no corporate income tax to any national government for that period mentioned above. The evidence shows that AOI is active in just two countries, Ireland and the United States. However, since Apple has determined that AOI is not managed or controlled in Ireland, functionally that leaves only the United States as the center of its management and control. In addition, its management decisions and financial activities appear to be performed almost exclusively by Apple Inc. employees located in the United States. Moreover, ASI is a subsidiary of Apple Operations Europe (AOE) which is, in turn, a subsidiary of AOI. Prior to 2012, like AOI, ASI operated with no employees and carried out its activities through a U.S.-based Board of Directors. In addition, like AOI, the majority of ASI's directors were Apple Inc. employees residing in California and the 33 board meetings that took place between 2006 and 2012 were located in Cupertino (California). Only in 2012,

after Apple's restructuring of its Irish subsidiaries, ASI was assigned 250 employees coming for its parent, AOE. Despite acquiring those new employees, ASI keeps its management and control is located outside of Ireland and continues to claim it has no tax residency in either Ireland or the United States.

Despite its position that it is not tax resident of Ireland, ASI has filed a corporate tax return related to its operating presence in that country, paying minimal taxes on its income. As shown in the chart below, In 2011, for example, ASI paid 10 million dollars in global taxes on 22 billion dollars in income; in 2010, ASI paid 7 million dollars in taxes on 12 billion dollars in income. Such low tax payments relative to ASI's income raise questions about whether ASI is declaring on its Irish tax returns the full amount of income it has received from other Apple affiliates or whether, thanks to its non-tax resident status in Ireland, ASI has declared only the income related to its sales to Irish customers. Over the period 2009-2012 ASI's income totaled about 74 billion dollars. A portion of this income was transferred to its parent, AOE, via dividends. ASI, which claims to have no tax residence anywhere, has paid little or no taxes to any national government on that income.

Table 2.2. Cost Sharing Payments and Pre-Tax Earnings of Apple Sales International (Ireland)

	Cost Sharing Payments By ASI	Pre-Tax Earnings of ASI
2009	\$ 600 million	\$ 4 billion
2010	\$ 900 million	\$ 12 billion
2011	\$ 1.4 billion	\$ 22 billion
2012	\$ 2.0 billion	\$ 36 billion
TOTAL	\$ 4.9 billion	\$ 74 billion

Source: Information supplied to the Subcommittee by Apple, APL-PSI-000129, 000381-384

Table 2.3. Cost Sharing Payments and Pre-Tax Earnings of Apple Inc. (United States)

	Cost Sharing Payments By Apple Inc.	Pre-Tax Earnings of Apple Inc.
2009	\$ 700 million	\$ 3.4 billion
2010	\$ 900 million	\$ 5.3 billion
2011	\$ 1.0 billion	\$ 11 billion
2012	\$ 1.4 billion	\$ 19 billion
TOTAL	\$ 4.0 billion	\$ 38.7 billion

Source: Information supplied to the Subcommittee by Apple, APL-PSI-000129, 000381-384

In addition to shielding income from taxation by declining to declare a tax residency in any country, Apple Inc.'s Irish affiliates have also helped Apple avoid U.S. taxes in another way, through the utilization of a cost-sharing agreement and related transfer pricing practices as explained in the above paragraphs concerning transfer pricing.

2.2.8. The complicity of Irish tax authorities

After a deep analysis of the described situation, the European Commission, in 2016, stated that Ireland had to retrieve 13 billion euros (plus interest) from Apple for the unpaid taxes during the period going from 2003 to 2014. This sum, that the commission recognized as to be paid from Apple to Ireland, was not linked to the Irish low-tax regime, rather it was a reimbursement for what had been identified as illegal State aid.

According to the Commission, from its analysis, it emerged that Ireland had been using state resources, under the form of foregone potential tax revenues, to provide advantages to a private firm. The consequences of this alleged State aid were to be found in a distortion of competition, as well as in effects on trade among member States, under the form of investments which would have been directed to other members of the European Union. The charge turned to Ireland was to have granted a so-called selective advantage to the American company. By selective advantage it is meant a specific leverage that is not available for companies or taxpayers in situations that are similar or comparable, giving Apple a not negligible advantage over local firms constrained to the regular tax rate by the national law.

Despite the fact that it seems pretty clear the existence of an Advance Pricing Agreement (APA) between the European State and the multinational company, that allowed Apple's Irish subsidiary to pay a corporate tax rate far lower than the 12.5%

paid by the other “common” Irish tax-payers, in July 2020 the EU Court overturned the 2016 ruling. According to the court, behind this decision, there is the failure of the European Commission to show that, through the tax deal, Ireland was giving Apple an unfair advantage, breaking the State-aid ruling.

2.3. THE INDIRECT COST FOR THE SINGLE CITIZEN

Something that is very hard to estimate is the side cost that burdens citizens, nevertheless, it is possible to make some speculations. In 2015, the Italian tax authorities accused Apple of withholding 880 million euros for sales booked in Italy in the 5 years between 2008 and 2013.

Basically, the company has been accused of what has been described above: following the same modus operandi all around Europe, Apple, was selling in Italy and paying the taxes relative to the Italian transactions in Ireland. For this misconduct, Apple Italia S.r.l., the Cupertino company’s Italian subsidiary, after a period of negotiations that lasted several months, accepted to pay 318 million euros, as refund for the unpaid IRES of the former 5 years.

The sum the company bargained, corresponding to 318 million euros, is nor the half of the total amount of taxes it avoided to pay, amounting to 880 million euros. The 562 million euros discounted to the company by the Italian government are coming

from the fear the States have of receiving no money, or to have to wait for very long and expensive lawsuits. The fact that the companies engaged in tax avoidance practices are always walking along a tightrope, on the line between legal and illegal, gives them chances of coming out as winners of the lawsuits filed by the national States. Together with the scale of the sums that usually are under assessment, this uncertainty regarding the lawsuits' potential outcome, gives such multinational companies an important bargaining power.

Trying to comprehend how much it costs to the average Italian citizen, it is important to bear in mind that, in 2015, the implicit tax rate on labor in Italy was around 43.5%⁸, rate that was and is still not negotiable. On the other hand, the corporate income tax rate in Italy was fixed at 31.3%⁹ back in 2015.

Despite the corporate income tax rate is already significantly lower, compared to the implicit tax rate on labor, the Italian government also found itself in the position of being bound to lower it even more.

Considering that the starting sum, which Apple Italia S.r.l has been accused of avoiding to pay¹⁰, amounted to 880 million euros and taking into account that the

⁸ European Commission, DG Taxation and Customs Union, based on Eurostat data

⁹ European Commission, DG Taxation and Customs Union, Taxes in Europe database and IBFD data

¹⁰ <https://tpcases.com/italy-vs-apple-dec-2015-settlement-on-payment-of-347-million-euros-in-back-taxes/>, URL visited on 14/06/2020

amount the company paid to the Italian fiscal authorities corresponded 318 million euros (Randacio, 2015), through an easy mathematical calculation it is possible to compute that the tax rate had been dropped from 31.3% to 11.3%, that is, in a few words, a reduction of almost one third.

2.3.1. Example of an Italian citizen

In 2015, the average Italian citizen's annual gross wage was estimated to be 30,710 euros (OECD, 2015), which means, for a single person with no dependent children, an annual take-home pay of 20,702 euros. Such a net wage is the result of a taxation of labor that amounts to 32.6%, without taking into consideration the portion paid by the employer.

If, hypothetically, the aforementioned citizen, was able to exploit the same channels used by Apple and to take advantage of the same discount, corresponding to one third of the total amount, he would have been able to raise his annual take-home pay from 20,702 euros to 27,239 euros.

A 30% increase in a worker's annual salary could significantly change his quality of life. By quantifying, every year, he could afford to eat in Galleria, the well-known Chef Cracco's restaurant, twice a month, he could relax by making a trip to the Maldives every three months or live a unique experience at the Venice Hilton hotel,

sleeping two nights in the presidential suite. Or, maybe, he could simply guarantee a higher standard of living for its family and adequate education for its children.

2.3.2. A widely adopted practice by multinationals

Apple Inc is just the tip of the iceberg; indeed, the vast majority of multinational companies are regular with practices linked to tax avoidance. Considering the share of the market in the hands of these corporations and the cash flow they are able to manage every year, the scale of the problem is much wider than it has been described and the average citizen's lifestyle could improve to a significant extent. To continue with the Italian example, for Italy, the profit shifting of some large multinationals produced in 2015 an erosion of almost a quarter of the taxable base of companies: 7.4 billion euros overall, a loss of 0.5% of the national income of that year (Fubini, 2018).

This 7.4 billion euro loss surely consists of services the citizens lost, but can also be quantified as a loss for the individual. In 2015, the Italian taxpayers were around 40 million euros¹¹: if multinational companies had paid the fair amount they had to,

¹¹ Statistiche Sulle Dichiarazioni Fiscali, Analisi Dei Dati IRPEF, Anno D'imposta 2015, https://www1.finanze.gov.it/finanze3/analisi_stat/v_4_0_0/contenuti/analisi_dati_2015_irpef.pdf?d=1592488800, URL visited on 22/06/2020

instead of avoiding the payment of the aforementioned 7.4 billion euros, every single taxpayer could have paid almost 200 euros less and the government would have collected the exact same amount of money for that fiscal year. This is just a further confirmation that tax avoidance damages, directly and indirectly, the citizen and the society as a whole.

To better figure out how much, in terms of service, the society lost, just think that the Italian government in 2018 invested 5.7 billion euros in research and development funds for the universities, both public and private¹². The estimated loss in corporate tax profits in Italy is the 130% of the money invested to develop new technologies. Undoubtedly, part of the money saved by the companies is invested in their own departments of R&D, but free shared knowledge surely has a different value.

¹² http://dati.istat.it/Index.aspx?DataSetCode=DCSP_RS#, URL visited on 01/07/2020

3. POTENTIAL METHODS TO DISINCENTIVE COMPANIES AND STATES TO PERPETRATE THE DESCRIBED PRACTICES

3.1. RAISING AWARENESS OF PUBLIC OPINION

Unfortunately, stopping corporations from perpetrating these practices is extremely difficult. First of all, it is complicated because in certain cases they act with the compliance of some States. Secondly, it is demanding because what they are doing is never breaking the law, it is just bending it. Whatever the States are doing to stop these practices, it is not proceeding fast enough because of the different speed of the two systems, the legal one and the economic one.

Nevertheless, during the last decade, the role of corporate social responsibility has been growing inside companies. This growth is undoubtedly led by the desire of firms to do their part in making the world a better place, but even more by the fact that consumers are becoming more and more aware of the good and bad practices that should or should not be conducted. Even though the corporate social responsibility is nowadays more oriented towards the achievement of environmental, equality and sustainability goals, it is definitely true that the 21st century consumer is becoming more sensitive to the choices of companies.

Although the effects of corporate tax avoidance on the consumer have not been placed at the center of attention, several studies (Asay et al. 2018; Graham et al.

2014; Hardeck and Hertl 2014) have found how these practices can affect both the reputation of the company and the consumer purchasing behavior.

Asay et al. (2018), in their experiment, asked two groups of consumers to express their preference between Amazon and Walmart, choosing between a 100 dollars voucher to spend in one of the two chains of stores. While the members of one group were left free to choose with no further actions, the participants of the other group were randomly treated with news regarding Amazon's tax policies and the multinational's tendency to practice aggressive tax planning.

The result was very clear: among the consumers belonging to the group that did not receive the news regarding the tax policies of the company, 83 percent chose Amazon, whereas among the members of the group provided with information regarding the company's tax policies, only 67% chose it. This 16 percent difference was dictated solely by the consumer's reaction to corporate tax avoidance, confirming that aggressive tax planning entails a substantial reputational cost and that, on average, the consumer prefers to buy from companies that adopt less aggressive tax policies. It should also be borne in mind that the effect was not moderated by whether participants are Amazon Prime members, suggesting that even loyal customers might be influenced by information about a firm's aggressive tax practices.

Hardeck and Hertl (2014) also came to similar conclusions, finding that an aggressive corporate tax strategy decreases corporate success with consumers,

while a responsible corporate tax strategy favors it. From the data they collected, they found out that a media report, regarding a protracted aggressive corporate tax strategy adopted by a company, reduces the consumer's desire to buy that brand. On the contrary, a media report on a responsible corporate tax strategy generates the opposite effect and pushes the consumer to buy that brand.

In addition to this, the effect that tax avoidance has on the company's reputation should be considered. This factor cannot be overlooked, in fact it is one of the elements that most influences tax planning decisions. Unfortunately, it is closely linked to the probabilities that the company has of being discovered. Obviously, it is a tradeoff that companies face in deciding whether to risk or not, based on the gain deriving from an aggressive tax policy and on the grounds of how high the risk of being discovered and, consequently, exposed by the media to the judgment of consumers is.

At this point it is also right to report another data that certainly does not help to encourage multinational companies to choose more responsible tax strategies. From a survey combined with the experiment in the aforementioned study by Asay et al. (2018), it emerged that the consumer is not at all aware of the tax policies adopted by the companies he buys from. The survey found out that only 20% of consumers remember having read, at least once, an article concerning the aggressive tax planning of any company.

3.2. BLOCKCHAIN SYSTEM

So, although the consumers' behavior is clearly influenced by how companies decide to organize their structure regarding taxation, unfortunately, at this precise moment, a system to judge the tax policies of corporations, to make the consumers aware and also to help guide them through their choice in the buying process, does not exist yet. The existence of such a tool would be crucial to push multinational companies to perpetrate much responsible tax policies. Indeed, if it is true that chasing them on the legal field is unproductive and also an expensive waste of resources, at the same time, giving to their customers the right tools to judge them for their actions, would be a strong incentive in order to be more responsible. The sales of a firm are much influenced by its corporate image.

To realize such a demanding tool, the first challenge would be the creation of a rock-solid system built to collect data from companies regarding their profits and worldwide transactions, including data concerning taxation, as to say, the country they pay in and the rate of taxation. The second challenge would be the creation of a system able to evaluate the practices of the companies, which must be incorruptible, objective and decentralized, in order to avoid the problem of sovereignty among States that a similar supranational tool would unavoidably give birth to. The third challenge would be to make it accessible by consumers, therefore, user-friendly.

A potential technology that could satisfy most of the requirements implied by the aforementioned challenges, is represented by the blockchain. As security, incorruptibility and decentralization are the main requirements by the tool that should be used to collect and process the data regarding the tax policies of corporations, blockchain technology is an excellent candidate to perform the required task.

To better understand it, it will be necessary to deepen the concept of blockchain in order to be able to specify how it could be applied in the specific case described so far.

3.2.1. History, peer-to-peer networks and distributed ledger technology

The Blockchain is a technology born in the nineties and applied in the early 2000s. It has found popularity thanks to its recent application in the world of cryptocurrencies, in particular Bitcoin. Although the Blockchain is the basis of this cryptocurrency, that would not exist without it, the opposite cannot be stated. Indeed, the Blockchain without the Bitcoin would still have plenty of possible uses. To understand how a Blockchain works, it is necessary to start from the definition of what P2P or peer-to-peer networks are. P2P are computer networks that use a dispersed and distributed architecture. All computers and devices have a certain share in the network: each device, or peer, is equal to the others. Consequently,

there is no central administrator of the network, every data available in a P2P network is shared among peers and for this reason a central server is not necessary. Collaboration between networked computers is the main purpose of peer-to-peer networks and it is also the basis for their functioning. P2P networks are typically used to share various files over the Internet, where peers are allowed to receive and send files at the same time. Therefore, to differentiate a P2P network from a classic server is the fact that, when a user is about to download a file from a classic server, his computer acts only as a client and it does nothing but receive from the remote server, to which the website directs it. This is a one-way process, where the data travels from point A, the remote server, to point B, the computer used. Instead, when using a P2P network, the file is downloaded by drawing pieces of it from other peers, who are part of the same network and, at the same time, sharing pieces of the file with other peers who request it. It is, to all intents and purposes, a two-way sharing, simultaneously receiving and sending parts of the file.

At the basis of a Blockchain there is also the distributed ledger technology, DLT, thus, when it comes to comprehending the functioning of the whole system, it is essential to firstly understand the basics. A distributed ledger is a database or log of information distributed over a network. With regard to the access to the distributed ledger, two distinctions must be made, in fact it can be unrestricted, that is, it allows anyone to access the registered information, or it can be limited, allowing access to

the information only to a certain group of users. Blockchain is basically a type of distributed ledger.

3.2.2. Characteristics and functioning

Once the concept of P2P network and distributed ledger have been outlined, it is possible to examine in depth the main characteristics of a Blockchain, as well as the way in which it actually works. The Blockchain is nothing more than a ledger of information replicated on all the computers that are part of a specific peer-to-peer network. Such peers are the nodes of the Blockchain and each node contains a full copy of the Blockchain, in addition to its history. In order to ensure the security and reliability of the information that is sent and received by the nodes, the network uses an encrypted communication system. Each node has two keys, one public and one private. The private one has the function of encrypting the messages that the node sends, while the public one has the function of decrypting the messages received from the other nodes.

Moreover, to further ensure the reliability of the available information, if a node wants to add data to the register, the other nodes must firstly confirm that the information added is correct. Once confirmation is received, the information is added to a block. This mechanism is called consensus.

The result is a chain made up of blocks containing:

- The data
- The hash
- The unique hash of the previous block

By hash it is meant a string composed of letters and numbers, produced by a univocal Hash function; in the specific case of the Blockchain, the string is created starting from the information contained into a specific block (including the hash code of the previous). This code simply connects each block with the previous one, effectively creating a chronological chain of blocks, hence the name Blockchain. The hash plays a fundamental role in ensuring the immutability of the ledger, in fact, by modifying, even minimally, the information contained within a block, the hash would be altered. Since the hash is contained in the next block in the chain, an alteration of the original block would also alter the following one.

Therefore, in the specific case of a modification, a mechanism would then be triggered that would alter and consequently invalidate the block in which the alteration occurred, as well as all those that chronologically follow it.

Furthermore, the distributed nature of the Blockchain, guaranteed by the peer-to-peer network is another protection for the whole system. To compromise it, an attacker should be able to modify, simultaneously, the 50% plus one of the copies owned by each one of the nodes being part of the blockchain. So, once a new block is validated by consensus and added to the blockchain, data cannot be altered

retroactively without the complicity of the majority of the nodes composing the network.

This immutability of the distributed ledger means that there is no longer the need for a central authority to act as an intermediary and to guarantee the security of data exchange.

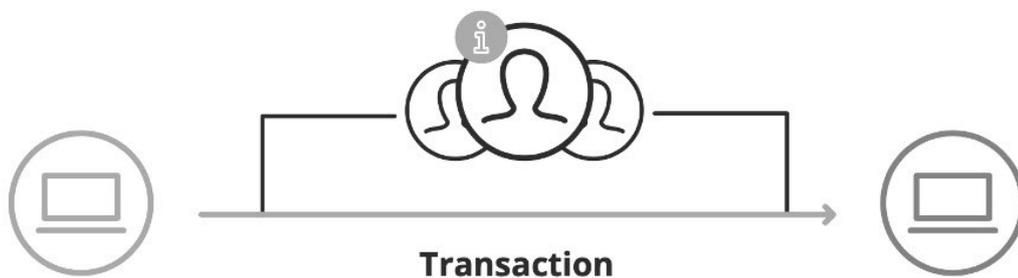
In the following figures, it is shown a step by step sample of how the Blockchain works to carry out a transaction.

Figure 3.1. The transaction is carried out



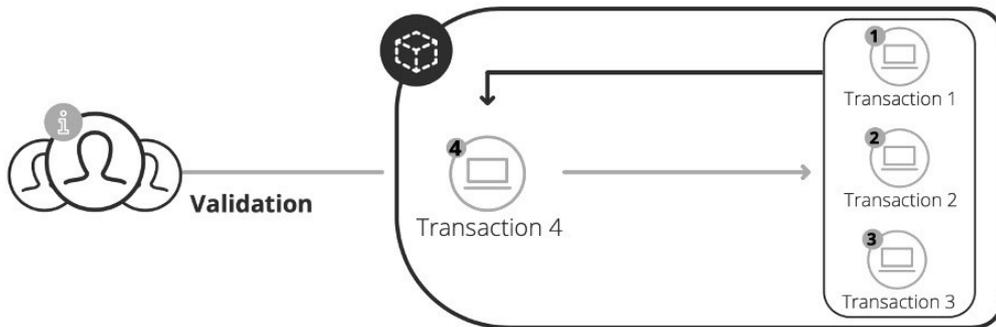
Source: Deloitte, *Blockchain technology and its potential in taxes*, 2017

Figure 3.2. All members of the blockchain are informed



Source: Deloitte, *Blockchain technology and its potential in taxes*, 2017

Figure 3.3. Community members check all information on the operation



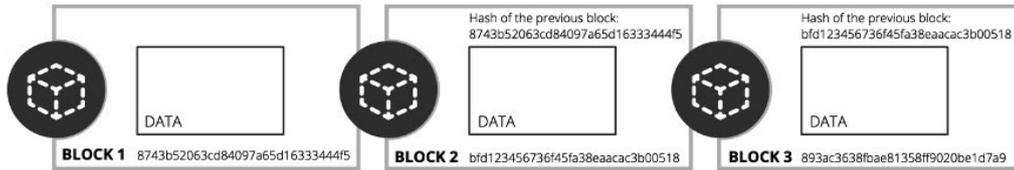
Source: Deloitte, *Blockchain technology and its potential in taxes*, 2017

Figure 3.4. The network of users confirms each new block



Source: Deloitte, *Blockchain technology and its potential in taxes*, 2017

Figure 3.5. The block is added to the chain



Source: Deloitte, *Blockchain technology and its potential in taxes*, 2017

3.3.3. The consensus mechanism

As previously mentioned, to record any operation on the ledger, it is necessary that the users, in other words the nodes, approve it in order to then be able to add the information to the block. This mechanism, defined as consensus, has the function of ensuring that the information contained in the block being added is truthful. The consensus methods that can be used by the Blockchain are multiple. The most common one, also because it is used by the well-known Bitcoin cryptocurrency, is that of the Proof of Work. This method is based on a competition between the so-called miners, also members of the Bitcoin network. The competition in which miners take part consists in solving a cryptographic puzzle: once the puzzle is solved, the new block of information, in this case a list of transitions, is added to the chain. The first miner who manages to solve the puzzle is rewarded in Bitcoins. The purpose of the Proof of work is to slow down the creation of new blocks, to prevent a computer with high computing capacity from modifying a block and all

the subsequent ones in order to validate the modification made. Unfortunately, this involves considerable disadvantages, indeed, in order to make it impossible to create many blocks at the same time, the puzzle that is generated requires considerable computing power to be solved. Consequently, mining implies a high energy consumption to perform extremely complex calculations that are basically useless.

An alternative solution to the Proof of Work is that of the Proof of Stake. In this case, the user who will be responsible for validating the block is selected through a pseudo-random election process. There are many factors that can affect the selection, including the staking period and the stake size. Indeed, users who apply as potential validators put a sum at stake, the higher it is, the greater the possibility of being selected. If they are selected, they will have the task of analyzing the block and validating it. If the validated block is corrupt, the user who validated it loses the amount he had previously put at stake, as well as the ability to act as a validator in the future. On the contrary, if the block is valid, he will receive a commission on the operation. The main limitation of the Proof of Stake algorithm is the fact that users with greater resources and, therefore, with the possibility of putting higher sums at stake, could impose themselves as validators and corrupt the chain. Nonetheless, by having higher sums at stake, they would also have more to lose and they would have less interest in the whole chain collapsing.

The consensus algorithms are numerous, the two described are the most common but there are many others and considering that the Blockchain is a young and not yet very developed technology, many others will be implemented, certainly more suitable even for Blockchains that are not related to cryptocurrencies.

The evolution of Blockchain made it suitable also for new usages, such as the smart contracts. Through smart contracts, blockchain can automate the execution of business workflows, making sure it is correct by the consensus mechanism. It is nothing more than a contract that is automatically terminated when certain conditions are met, through an automated programming code. The main advantage of a smart contract is that it makes the figure of an intermediary obsolete, allowing the parties to interact independently.

3.3.4. Permissionless and permissioned blockchain

To continue, it is necessary to distinguish two types of blockchains that have been developed with the evolution of this technology: the permissionless blockchain and the permissioned blockchain.

The permissionless blockchain has the characteristic of allowing all the nodes of the network to share and monitor records, which consequently are not owned and controlled by anyone. Bitcoin technology is based on a permissionless Blockchain, in fact anyone can, through a device with internet access, connect to the network.

The strength of a permissionless blockchain is therefore decentralization, given that, as specified above, the records are neither owned nor controlled by anyone.

Blockchain was initially designed as a public distributed ledger, to spread it as much as possible, making it more secure. When its application shifted to the business environment, restrictions started to be applied on who would have been able to be part of the chain. Indeed, whereas a public, hence permissionless, blockchain is perfectly suitable to ensure transactions in a trustless environment, when it comes to business applications it shows some weaknesses. Mainly these weaknesses are linked to privacy, to the responsiveness of the system, that may involve long waits before reaching the consensus, and to its updatability, as the synchronization could take long because of the huge amount of anonymous participants that could disagree.

From the need to limit access to the blockchain, coming from the concerns of the entrepreneurs fearing a potential leak of business secrets, a private, or permissioned Blockchain was born.

A permissioned blockchain has restrictions regarding the membership and control procedures. In this kind of blockchain, an intrinsic configuration defines the roles of the nodes, by specifying the users who can: access the blockchain, add data to it and approve the access of new members. The control of the various levels at which the nodes of the permissioned blockchain are allowed to accede, guarantees the privacy of the users. At the same time, this kind of configuration no longer

guarantees a complete decentralization but only partial one. Indeed, since multiple members have different access and control permissions, partial decentralization is guaranteed, therefore, allowing a centralized authority with override privileges, the reliability and integrity of the blockchain could be undermined.

Mainly these two types of blockchains, permissioned and permissionless, differ in the properties that characterize them. As already discussed, the trustlessness and immutability of the blockchain are two of the main characteristics of the technology in question. When talking about trustlessness a reference is made to the fact that no node has to rely on the honesty of others, there is no need for him to place his trust in someone else. This feature is fully respected by a permissionless blockchain, thanks to the absence of intermediaries or central authorities, and thanks to the fact that, once the data has been added to a block in the chain, they are immutable and guaranteed by all the copies on the network.

A permissioned blockchain could fail to guarantee the same level of trustlessness. In fact, by granting the override authority to a centralized authority, it opens the door to the eventuality that the data gets corrupted and that, with the consent of the majority of the nodes, the history gets also altered. This would be more likely due to the reduced distribution of copies of the blockchain. Therefore, trustlessness, in some cases, is not guaranteed and the reliability of the blockchain is, in this instance, linked to the credibility of the centralized authority and the solidity of the consensus protocol.

To conclude, the permissioned or permissionless nature of blockchain affects two other properties: distributed consent and transparency.

As for permissionless blockchains, transparency of data and their correctness are guaranteed by the fact that all copies are constantly synchronized to obtain consent. Furthermore, it is always possible to access the history and reconstruct the data flow at any time.

A permissioned blockchain, also with regard to transparency, fails to guarantee the standards guaranteed by a permissionless one. In fact, since the master copy is not shared in its entirety with all participants, many of them may only have a partial copy. Confidentiality greatly limits the transparency of the permissioned blockchain.

Nevertheless, the permissionless blockchain presents a significant limit, which is linked to the costs coming from the heavy computation needed to create trust. This makes the use of a permissionless blockchain for a private business environment or for other applications, that cannot count on a consistent number of nodes like the cryptocurrencies can, prohibitively expensive.

3.3.5. Consortium blockchain

To overcome the limits of both permissioned and permissionless or, private and public blockchains, hybrid systems, such as consortium blockchain have been

developed. The consortium blockchain is a system that is semi-private and has a controlled user group but works across different organizations. It is based on an architecture that benefits from the efficiency, in terms of time and costs, and the privacy of private blockchains, while exploiting the decentralized governance of public blockchains. The nodes of consortium blockchains share the authority among them, furthermore, the ledger is deployed in a decentralized manner on multiple hardware, managed by the different nodes. Even though a consortium blockchain is capable of maintaining the immutability of the data, it also allows a rollback of the blockchain, a feature that for a public one is almost impossible to achieve.

With respect to consensus, in a consortium blockchain, it is neither public, nor managed by a single owner, but rather it is managed by a set of participants. In a public or permissionless blockchain, the nodes that will act as validators and add a new block, are selected randomly, in order to prevent malicious nodes from adding fraudulent blocks. Since their probability to be chosen as validators is very low and since, in the case of a Proof of Work consensus method, they should also compete with the other validators in order to be the first one to solve the cryptographic puzzle, the likelihood of a successful attack is very low. Only through a so called “51% Attack” the security of the blockchain could be undermined. A “51% Attack” happens when more than half of the nodes of the network composing the blockchain are allied with the malicious node, making his version of the ledger the main one.

In a permissionless configuration, the validators are anonymous and for this reason the consensus protocol is crucial for the integrity of the blockchain, while, in a consortium configuration, the validators are known, selected and trusted. Thanks to this, the consensus protocol complexity can be reduced, decreasing also the required computational power, as the consensus algorithms are less complex, hence, less energy-intensive, less expensive and faster.

4. THE DAWN OF A NEW SYSTEM

4.1. BLOCKCHAIN APPLICATION TO FIGHT TAX AVOIDANCE

Now that the basic concepts needed to understand the technology behind the blockchain have been addressed, it is possible to analyze the potentiality coming from the application of this distributed ledger technology to the international taxation system.

According to PWC UK (2016), the blockchain could be the driver of a more responsible behavior of taxpayers because of the risks coming from the non-compliance. As the chance of getting caught and excluded from the blockchain network for non-compliance is high, blockchain could help reduce the tax gap to some extent.

Essentially, blockchain technology helps parties, who normally would not trust each other, to carry out operations without the need of a centralized authority. Just by providing the parties a shared and reliable source through a distributed ledger.

As previously assessed, one of the main obstacles for the tax authorities is represented by the other tax authorities. The lack of cooperation and the absence of the determination in finding a shared tax policy, allow multinational corporations to exploit the differences between national systems for their own advantage. The mechanism of competition between different States' tax authorities, is another

aspect that benefits the corporations. Multinational companies, by shifting their profits from a country to another, are able to choose the most convenient rate at which their corporate profits will be taxed, therefore, without respecting the key principle of international corporate taxation, stating that profits should be taxed in the country where the economic activity that allowed their realization was conducted.

As long as these practices are favoring the few at the expense of the many, the majority of the states should be interested in finding a suitable solution, which could be represented by blockchain technology.

A blockchain system, made up to collect all the transactions between corporations and tax authorities from all over the world, would, first of all, solve the problem related to the absence of a shared database collecting data regarding tax payments. Moreover, it would ensure greater cooperation between international tax authorities, which, through a cross-check, could compare data regarding corporate profits with data regarding taxation. This would make it possible to compare the regional profits of a company with the taxes that the same firm has paid in the relevant region, highlighting any illicit.

Another possibility that would certainly be eliminated, would be the one of double non-taxation. A situation like the one previously reported in the Apple case, where the company, taking advantage of the differences in Irish and American laws regarding tax residency, managed not to pay taxes in either country, would certainly

not repeat itself. Indeed, by comparing corporate profits and paid taxes, the shortfall would immediately be noticed. Similarly, a derisory corporate tax rate such as that offered by Ireland to the Cupertino company would lead to an immediate reaction from the international community, which would investigate the occurrence of a case of State aid.

4.1.1. States of the OECD as nodes of the Blockchain

In order to allow the control of a complex system, such as that of international taxation, blockchain should have a specific structure.

A potential configuration could be that one which sees world States and multinationals as nodes of the same blockchain consortium, where States would be the nodes with override authority, and multinationals would be the nodes with a restricted access.

Until now many of the difficulties faced while looking for a common solution for all States regarding taxation, came from the question of sovereignty. No State was willing to submit to a central authority that could impose a specific fiscal policy on it. For this reason, blockchain could represent an excellent solution. Thanks to its decentralized nature, as already mentioned, each State would have the same authority within the network and would act as a validator. Furthermore, through the

use of a blockchain consortium, each State would be free to maintain its own corporate tax rate.

The revolution would also derive from the fact that the states would have the task of validators. As such, they would have the responsibility of checking the reliability of the data and give their consent, allowing the data to be recorded in the distributed ledger. To go into more detail, suppose that a multinational company makes an annual profit of 10 million euros in Italy, with a corporate tax rate equivalent to 24%: the firm would have to pay the Italian tax authorities an amount equal to 2.4 million euros. Before the transaction takes place, the company and the Italian government should submit a request to the validators, to go through the consensus mechanism. Once the validators have given their consensus, the transaction can take place and the block becomes part of the chain. In this case, the consent will be requested from the nodes with the role of validators, therefore, from the other States. In this way, transactions would always be under the full control of the international community and the distributed ledger would allow data to be analyzed at any time.

4.1.2. Other advantages of decentralization

The distribution of the blockchain would in this case be limited to multinational companies and States, which would have the leadership. Indeed, a blockchain with a permissionless architecture would leave an open side to the possibility of a “51%

Attack”, if the multinationals corporations decide to join forces. With a blockchain consortium, on the other hand, multinational companies would be nodes, with access to the distributed ledger, but without the possibility of modifying it without the consent of the States.

Each block of the blockchain proposed so far should contain all the data regarding taxes payment therefore:

- Who the interested parties (the multinational and the State) are;
- The profits of the company, in the specific country, in the analyzed period;
- The tax rate of that country for the fiscal year in question;
- The request for authorization and the States that have given their consensus;
- The data of the transaction that took place;
- All the relative dates.

A further advantage that would derive from the implementation of blockchain to fight tax avoidance, would be a shorter reaction time from the authorities. As already mentioned in the first chapter, the different speeds at which economy and law move, significantly limit the tax authorities when it comes to fighting tax avoidance. Indeed, the time necessary to notice, analyze and verify the actual existence of an offense, in order to intervene, is very long. On the other hand, multinational companies need very short times to reorganize, find and exploit another flaw in the system.

Once the actual presence of a tax avoidance practice has been verified, the intervention of the tax authorities takes place in two directions. On the one hand, they try to recover part of the lost income, through very slow processes that do not always lead to the desired result. On the other hand, by changing the regulation, they ensure that the weakness of the system will not be further exploited in the future. In these cases, the main problem is represented by the fact that the time required for a tax authority to notice the avoidance is generally quite long.

Blockchain technology could help on both fronts. On the one hand, thanks to the shared database, which all the concerned States can access to, an ongoing tax avoidance practice would immediately catch the eye of the tax authorities, either if it is carried on with or without the complicity of the involved states. On the other hand, it would make it much easier to verify that a tax avoidance practice has actually been perpetrated, through the distributed ledger collecting the history of all past tax activities.

By addressing the problem promptly, the tax authorities would considerably limit the losses, indeed the sums are not always recovered, as shown by the Apple case, in which, for the avoidance of the 2009-2012 time period, a legal battle was carried on until July 2020 without recovering any dollar. In light of this, it is clear that stopping the avoidance as soon as possible is certainly more convenient than trying to recover the lost sums afterwards.

4.2. POTENTIAL DIFFICULTIES IN INTEGRATING THE SYSTEM

Although a similar configuration of the international tax system would make everything related to taxation simpler and more transparent, it would certainly encounter considerable difficulties in gaining approval from states and multinational companies.

4.2.1. Resistance from the States

As learnt from the history of the past years, some international players have no interest in the international tax system becoming more transparent and fair. An example is provided by the resistance to the adoption of the Common Consolidated Corporate Tax Base or CCCTB. As described in the first chapter, in the case of the CCCTB, some States have appealed to national sovereignty, therefore to their right to choose the corporate tax rate to be applied on their territory, based on the needs dictated by their economy.

Sovereignty is certainly a sacred and infeasible feature for a State. For this reason, it would be very important to structure the blockchain system in such a way as to ensure that all States are on the same level and that none of them have to bow to the will of a central authority. Nevertheless, being the direct interests of some nations

at stake, there will certainly be opposition to the integration of blockchain into the international tax system.

Fortunately, considering that the current system harms many more States than it actually benefits, it is likely that a joint action by States that have an interest in making the system more balanced could be able to bend the resistance of the few States that have an interest in maintaining it unchanged. At the same time, the fact that the majority of States would have an interest in the blockchain-based tax system not being corrupted and remaining operational, the consensus protocol would also be better protected from any attack.

4.2.2. Resistance from multinational companies

Another challenge that could be faced would be the opposition by multinationals to the implementation a system that would make profit shifting more difficult and would certainly affect the shareholders' earnings. Furthermore, if the blockchain-based international tax system were adopted, multinational companies could still continue to play the cat and mouse game with the tax authorities of various governments: they would just have to run faster and change their avoidance schemes more often.

4.3. HOW TO INCENTIVIZE ITS ADOPTION

To stimulate the various actors involved in the described network to adopt the blockchain-based system, one option could be to leverage the sensitivity of the consumer. As previously discussed, corporate social responsibility is acquiring increasing importance in influencing the corporate policies of multinational companies. The awareness of the consumer is increasing, and the choice is more and more guided by the way in which firms interact with the society in which they operate.

The international community could certainly exploit this trend in its favor, instead of chasing multinational companies to collect taxes, it could invest resources to sensitize consumers and make them aware of what aggressive tax planning entails. Indeed, as found by Asay et al. (2018) in order for the tax strategies of companies to influence the customer's purchase decision, it is necessary that the consumer first acquires basic information to judge the tax strategies himself. Consumer awareness is a major barrier to its response to corporate tax avoidance.

Having a careful consumer, who chooses the product to buy taking into account the responsibility shown by the company, even at a tax level, would be a very strong incentive for multinational companies to fulfill their tax duties and to proudly display that to the consumers.

Nonetheless, to make possible a system that allows the consumer to judge the tax policies of a company, an objective and universal yardstick is necessary, based on how many taxes the company pays and where it pays them. In fact, if it is to be a tool to guide the citizen's choice, it must be based on parameters that directly affect him.

4.3.1. The Fiscal Responsibility Index

For this purpose, the international community could make use of an index which, based on data regarding the taxes paid by companies and the regional profits they make, judges the social responsibility of the examined firm, with regard to the tax policies that it follows. By calculating the ratio between the taxes paid by the company in State "A" and the profits made by the company in the same State, the effective tax rate (ETR) paid by the company in State "A" could be computed.

$$ETR^A = \frac{\textit{Taxes Paid to the state "A"}}{\textit{Revenues realized in the state "A"}} \times 100$$

In turn, comparing the effective tax rate (ETR) with the corporate tax rate (CTR) of State "A", a numerical value would be obtained. This value, taking the name of "fiscal responsibility index" (FRI) and ranging from 0 to 1, quantifies the

company's social responsibility in the reference state and it is a totally objective measure.

$$FRI^A = \frac{ETR^A}{CTR^A}$$

The more the value of the fiscal responsibility index is close to 1, the more the company under examination pays a tax rate close to what State "A" requires. A value of less than 1 indicates that the company is paying less taxes than required by the tax regime in which it operates. A value greater than 1, instead, indicates that the company is paying more taxes than it is required by the corporate tax rate imposed by State "A".

The index should then be accessible to the consumer and easily available. An option could also be to indicate it compulsorily on the products on display, as happens, for example, with the energy class of household appliances.

Once a similar system has been developed and after taking consumer awareness to the next level, it will be in the interest of companies to adopt more responsible tax policies.

4.4. BLOCKCHAIN TO INTEGRATE THE FISCAL RESPONSIBILITY INDEX

Surely, the chances of encountering resistance by multinational companies to the adoption of such a structured system are high. However, by involving consumers, who are the lifeblood of companies, and considering that companies themselves often boast the title of responsible and fair taxpayers, this resistance should not be difficult to defeat.

By checking on Apple's webpage, for instance, it is easy to find some declarations that the multinational company made about their tax policies: "Apple believes every company has a responsibility to pay its taxes, and as the largest taxpayer in the world, Apple pays every dollar it owes in every country around the world. We're proud of the economic contributions we make to the countries and communities where we do business... ..We understand that some would like to change the tax system so multinationals' taxes are spread differently across the countries where they operate, and we know that reasonable people can have different views about how this should work in the future. At Apple we follow the laws, and if the system changes we will comply. We strongly support efforts from the global community

toward comprehensive international tax reform and a far simpler system, and we will continue to advocate for that”.¹³

Similar declarations are made by most of the major multinationals operating around the world. These declarations are driven by the willingness to show to the outside a more responsible image of the company. Multinationals tend to justify their conduct regarding aggressive tax planning by stressing that these behaviors are in no way illegal, thus underlining that their actions cannot be condemned. This is the reason why it is important to structure a judging system that is based not only on legality, but also on the morality of the choices that companies decide to make. Since aggressive tax planning harms society as a whole, as it has been analyzed in previous chapters, it is necessary to fight and to condemn it.

The two systems described, blockchain and the fiscal responsibility index, could play a fundamental role in minimizing the economic damage resulting from tax avoidance. Blockchain would be essential to monitor the tax payments made by multinationals around the world, even if it does not have the necessary characteristics to help the consumer in judging the fiscal policies carried on by companies. The fiscal responsibility index is instead a very simple tool in the hands

¹³ <https://www.apple.com/newsroom/2017/11/the-facts-about-apple-tax-payments/>, URL visited on

20/08/2020

of the consumer, who can count on an objective tool that guides him in his choice by increasing his awareness regarding tax policies. However, the fiscal responsibility index needs a structured and reliable database from which to collect all the data necessary to calculate the value that will act as a judgment for the companies in question.

The potential of blockchain and the fiscal responsibility index in the fight against tax avoidance would therefore be significantly higher if the two systems were integrated. The blockchain system designed to combat tax avoidance is in fact structured to collect data; the data collected also includes those necessary to calculate the fiscal responsibility index. Indeed, it records both the taxes paid and the profits made in every single State that adheres to the blockchain-based system. At the same time, the fiscal responsibility index would play a fundamental role in bridging the limits that a system based solely on blockchain would have.

As previously highlighted, fighting tax avoidance via blockchain would encounter, first of all, difficulties inherent in implementation, deriving from the foreseeable resistance that multinationals would oppose. Furthermore, if the implementation were to be successful, companies could still continue to flee the tax authorities: the only difference would be that they would have to change their model more often and faster.

Through the combination of the two systems, blockchain and the fiscal responsibility index, multinationals could no longer play the same game behind

citizens, but they should do so out in the open. Citizens would therefore have the opportunity to judge the practices of multinational companies, regardless of whether they are legal or not. The consumer's judgment would be more focused on moral factors. Furthermore, in light of the statements made by the companies themselves, such as those reported above, if they were to oppose the adoption of a system that promises greater transparency and that could make taxation more fair and balanced, they would then have to face the reputational costs that would arise.

CONCLUSION

The work provides an analysis of the direct and indirect costs borne both by society and by the individual. In light of the negative consequences that tax avoidance practices cause to society, it is clear that decisive action is necessary.

Considering the speed with which the international economy and the market continuously evolve, the tax system cannot afford to lag behind, it must adapt and, if possible, anticipate the counterpart's moves. For this reason, the paper proposes a solution that relies on a state-of-the-art system, based on relatively young technology and which gives space to many future developments. Blockchain technology, thanks to the characteristics that distinguish it, such as decentralization, high security and inviolability, fully meets the necessary requirements.

The innovation brought by the work is certainly to be found in the application of blockchain technology to the international tax system, in order to create a distributed database shared internationally, to address tax avoidance. The author proposes a system based on a hybrid blockchain technology, a consortium blockchain, where the States will be equal nodes, with greater authority than companies that will also be nodes of the blockchain but without the decisive role of validators, that belongs to the States.

Analyzing the characteristics of blockchain technology, the author found potential limits related to the disclosure of the collected material. For this reason, the author

found the need to develop a “fiscal responsibility index”, which can act as an intermediary and allow to reach the consumer. The consumer is in fact at the center of the system, being the source of profits for multinational companies, the latter ones will not be able to ignore his needs and preferences. While firms can try to escape their responsibilities to tax authorities, they cannot escape from consumers, on the contrary, they constantly chase them.

The fiscal responsibility index is the second innovation proposed by the paper and it is a means of directing the consumer’s choice towards companies that respect their tax obligations, thus making it in the interest of themselves and the community. With the support of blockchain technology, the system is objective and secure, in fact, its decentralized nature ensures that no State and no company can obtain favorable treatment and that no one imposes itself on others, thus maintaining the sovereignty of each State intact and the competition between companies fair.

The evolution of blockchain technology will give ample space to future studies and implementations of the system described; the study aims to provide a starting point for any further investigation. One of these could be related to the use of smart contracts, which, exploiting the architecture of the blockchain, could automate the processes related to taxes that are constantly carried out and repeated by companies and States.

The automation of such processes significantly increases their efficiency. With regard to efficiency, it does not only mean time and resources, but above all the crucial role that a similar system could have in limiting losses due to human errors and bad practices conducted by firms. Through the adoption of self-executing smart contracts, transactions, whether relating to a purchase or payment of an employee's salary, would be automatically taxed and the money would be sent directly to the interested tax department.

To conclude, although, the proposed system, based on blockchain architecture and on the fiscal responsibility index, was born from an idea of the author and although it needs further investigation and future studies to be perfected and finally successfully implemented, the international system suggests that the future that lies ahead will be precisely in this direction. In fact, the European community has already created the European blockchain membership. Adhering members undertake to work together towards realizing the potential of blockchain-based services for the benefit of citizens, society and economy. The Partnership is building a European Blockchain Services Infrastructure (EBSI) which will deliver EU-wide cross-border public services using blockchain technology. This could represent a springboard to apply blockchain technology to the context of international taxation which, combined, as proposed, with the fiscal responsibility index can finally lead to a significant reduction in the social cost determined by the tax avoidance that weighs on the shoulders of the individual citizen.

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RINGRAZIAMENTI

La stesura di questa tesi è stata per me un'occasione di crescita ed ha dato spunto a molte riflessioni più o meno inerenti allo studio svolto. Ora che sono giunto al termine di questo percorso vorrei spendere qualche parola per ringraziare coloro che mi hanno accompagnato in questo viaggio.

Vorrei ringraziare il prof. Samperna, relatore di questa tesi di laurea, non soltanto per l'aiuto fornitomi durante la stesura ma anche per la passione che è stato in grado di trasmettermi durante le sue lezioni, facendomi avvicinare con curiosità ed interesse a questo campo di studi. Senza di Lei questo lavoro non avrebbe preso vita.

Un grande ringraziamento va ai miei genitori che non mi hanno mai fatto mancare il loro sostegno e non hanno mai smesso di credere in me. La vostra guida ed il vostro esempio sono e sempre saranno un riferimento per me. Grazie di tutto l'amore e l'appoggio che mi avete dato incondizionatamente.

Non posso omettere gli Amici, quelli che meritano la "a" maiuscola, Andrea, Francesco e Paolo, con voi ho iniziato il percorso universitario, abbiamo preso strade diverse ma siamo in qualche modo rimasti sempre vicini, grazie per esserci sempre stati.

Un grazie speciale va ai compagni di corso, con cui ho condiviso questa magnifica esperienza, con i suoi alti e bassi, le sessioni più intense, i progetti che si

trascinavano fino all'orario di chiusura della biblioteca, poi delle aule studio e alla fine degli occhi. Grazie perché in voi ho trovato degli ottimi colleghi ma anche dei sinceri amici, sempre pronti ad aiutare e sempre pronti a festeggiare una sessione finita.

Grazie a Sara, con cui ho condiviso questo percorso universitario e non solo e che si è dimostrata un'ottima compagna, dentro e fuori l'Università. Grazie per essermi stata accanto in ogni momento, per avermi sempre spronato a fare meglio, per non aver mai esitato a fornirmi il tuo supporto e grazie per avermi regalato dei bellissimi momenti.

Un sentito grazie a tutti!

Lorenzo Giuseppucci

Camerino, 18 settembre 2020.