

Preface

This book examines the main issues discussed in the field of public finance today. These issues are perhaps identified among policy areas that will come to the agenda of many governments over the next decade. Topics covered in the book are as follows; revenue forecasting models, the taxation of sharing economy, tax incentives provided to green bonds in financing of energy efficiency, the importance of tax literacy in tax compliance, the concept of collective investment institutions, digitalization of tax administration and complexity of tax system, macro determinants of pharmaceutical spending, tax expenditures as internal tax bleeding, the size of the public sector and the Armey Curve, Okun's Law, subsidies granted to the private educational institutions, and taxation of artificial intelligence. The book consists of twelve chapters on "controversial issues in the public finance" mentioned above. The large part of chapters published in this volume was selected among the presented papers in the 34th International Public Finance Conference/Turkey in April 2019. They also went through a review process before publication.

Erdođdu and Yorulmaz compare the performance of three forecasting tax revenue models such as Random Walk, SARIMA, and BATS for Turkey throughout 2006:01 to 2018:12. They find that using the BATS model, rather than classical (SARIMA) in forecasting series of monthly tax revenues of Turkey, provides more accurate forecasts. The empirical findings of this study help the experts in the preparation process of the government's budgets.

Bozdođanođlu emphasizes that the sharing economy is a functioning economy through online platforms and makes it difficult to evaluate within the framework of tax and legal regulations, such as the traditional economy. In this study, taxes, which are the subject of sharing economy, which is a new economic model, and cooperation with platforms and determination of taxpayer awareness, are included.

Yiđit Őakar discusses the financing of energy efficiency and argued that as an alternative to financing energy efficiency, green bonds are developing rapidly all over the World. Green bonds are financial instruments that provide opportunities for investors to participate in the financing of "green" projects that help reduce the negative impacts of climate change and adapt to the effects of climate change, reduce CO₂ emissions, prevent environmental pollution, and improve social welfare. These structures have an essential impact on the realization of sustainable development.

Çetin Gerger, Bakar Türegün and Gerçek highlight the importance of tax literacy as one of the factors that determine tax compliance. They also examine arrangements and projects related to tax literacy in the OECD countries and the United States, along with the presentation of the projects and research related to tax literacy in Turkey. In the study, they conclude that the level of tax literacy in Turkey is not at the desired level. Thus they provide suggestions regarding the activities that could be conducted to increase tax literacy.

Keskin evaluates the importance of collective investment institutions operating in the World under three legal structures, namely investment company, trust, and contractual model, to enable investors with low savings to work in the financial markets. Also, she analyses the advantages provided to these institutions and their investors in Turkish tax legislation.

Giray argues that the digital tax paradigm would inevitably necessitate a change in countries' tax systems. The digital tax administration can create an opportunity to raise tax-income without raising the tax burden. This study investigates the impacts of the digitalization of tax administration on the complexity of the tax system with the indicators of some OECD countries.

Varol İyidoğan, Balıkçoğlu and Yılmaz examine the effect of aging, chronic diseases, health care expenditures and social spending on pharmaceutical spending for 22 OECD countries by employing General Method of Moments (GMM) procedure of Arellano and Bond (1991) which utilizes the difference of dependent variable to eliminate the individual fixed effects. In this paper, they conclude that the rise in the elderly population leads to an increase in pharmaceutical spending, which is consistent with our expectations.

Saygılıoğlu investigates the concept of tax expenditure and its meaning in theory. It is used as a concept that reduces the tax burden of taxpayers for various purposes and expresses regulations such as exemptions and exemptions in public. The study describes the theoretical framework and reasons for assets of tax expenditures, and discussing its size and results in Turkey to attract the attention of business and politics.

Yüksel studies the relationship between economic growth and public spending as a percent of GDP (government size). One of the essential explanations of these debates is the Armey curve. The parabolic structure of the Armey curve is critical for estimating the optimal government size. This study aims to test the Armey curve using the ARDL bounds testing approach of time-series techniques between the years 1981–2018 in the Turkish economy.

Mercan and Özpençe investigate the relationship between economic growth and unemployment via Okun's Law. In this study, the relationship between economic growth and unemployment for the Turkish economy is calculated. In this

context, the growth policies determined by governments will contribute to minimizing this problem by encouraging employment.

Özel Özer, Özer and Akın evaluate the subsidies granted to the private educational institutions within the framework of the Turkish tax system. This study elucidates and analyses the arrangements and recent developments concerning grants of space and location for investments and exceptions regarding the insurance and tax exceptions and exemption within a general framework in Turkey for educational institutions.

Biyın and Yılmaz discuss the issues of how artificial intelligence can be taxed in accordance with the discussions going on about the same. The main point derived implies that it does not seem plausible that artificial intelligence could become a taxpayer as per the applicable legal system in force.

We hope that the current volume would be very useful for both academics and policymakers not only in Turkey but also in many developing and developed countries alike.

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Artificial Intelligence: If It's Taxed, But How?

“Artificial intelligence will be either the best or the worst thing ever to happen to humanity.”

Stephen Hawking

Abstract: In today's world of rapid digitalization, the widespread use of artificial intelligence has reached such a level that it will have some consequences in terms of public finance. The change in employment policies due to the external factors resulting from the prevalent use of artificial intelligence, and therefore the possibility that budget revenues might be affected, has led to the discussions about the taxation of artificial intelligence. This study discusses the issues of how artificial intelligence can be taxed in accordance with the discussions going on about the same. The main point derived implies that it does not seem plausible that artificial intelligence could become a taxpayer as per the applicable legal system in force.

Keywords: Artificial Intelligence, Robot tax, Digitalization, Taxation

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1 Introduction

Non-stop growth of technology beginning with the invention of the steam engine continues tremendously owing to Industry 4.0 today, with direct effects on human living. Widespread use of the internet, fast-paced of robotization, and development of artificial intelligence have risen some question marks in the minds as to where the social and economic life would head. Internet of things (continuously connected to the net), smart cities, smart buildings, autonomous (self-driving) cars and, ultimately projects involving the participation of AI robot in the workforce; have been included in the agenda of the governments as the topics to be discussed regarding the future policies. All these developments, which we tried to outline briefly, have also been reflected in the field of public finance. Inevitable radical changes in the ways of work and business manners soon have led to the fact that employment, economic, and fiscal policies should be reconsidered. This study deals with such a massive increase in technology from the perspective of the “externality” theory as part of public finance. Although the term “technological development” sounds excellent, the discussions began whether it has created positive or negative externality, considering the results it created or it might result in in the future.

On the other hand, legal science has also had to accommodate itself to technological developments. Likewise, the changes in business models and working methods required the adoption of harmonized arrangements in terms of private and public law. The fact that whether artificial intelligence, related to our study and analyzed in great detail, can be given personhood and then be assigned a responsibility has been the main topic of most branches of law. Also, the tax law is dealt with as part of these discussions and thus has to produce solutions.

The conclusions derived at the end of these discussions would lead to the clarification of the technological developments in the face of taxation regimes. Therefore, according to the questions concerning the discussions focusing on the core of this study, it will be necessary to make assessments as to whether the artificial intelligence should be taxed and based on the arguments made and seek solutions. Before we go ahead and address the discussions and our opinions about the taxation aspect of the study, the concept of artificial intelligence will be outlined, and the predicted results will be expressed, after which the research will address the suggestions on how to impose a tax, referring to the opinions in the doctrine.

2 Artificial Intelligence and Characteristics

2.1 Artificial Intelligence Conceptually

The emergence of the concept “artificial intelligence”, formed with the combination of the individual terms artificial and intelligence, dates back to the 1940s. It was in the 1940s that McCulloch and Pitts attempted to express the concept of “intelligence” mathematically for the first time. In 1948, William Gray Walter built two small robots called “Elmer” and “Elsie” and enabled them to respond to obstacles they hit (Huang Z, 2018: 1818). In 1950, Alan Turing carried out some studies on computerized machines and intelligence. He indicated that communication could be established between man and machine, thanks to his experiment known as “Turing Test”. In the Turing experiment, he enabled a man to talk with both a man and a machine simultaneously; and he proposed that the computer passed the test when he noticed that the man could not distinguish between the device and another person. So, it was how the first steps were taken towards the evolution of artificial intelligence (AIR, 2018: 2). At the Dartmouth workshop in 1956, the term “artificial intelligence” was proposed, claiming that it was a discipline (DDAIT, 2018: 1818).

First used by McCarthy in 1955, Artificial intelligence can be defined as “*a machine capable of solving problems that individuals can solve with natural intelligence*”. But, the part which underlies the concept of artificial intelligence

with a broad insight, and is concerned with our study, is that the machines have learning skills. In other words, a machine with artificial intelligence corrects the errors or mistakes made by trial and error; namely, it can learn. Statistical models, created with inspiration from the neural networks in the human brain, comprise the artificial neural networks. These neural networks enable deep learning method can be implemented (Yüksel, 2018: 588–589). Artificial intelligence is a system that performs normal human intelligence functions such as perception, learning, development, creativity, communication, decision-making, conclusion, etc. (Zorluel, 2009: 308). Artificial intelligence is considered one of the leading events in the 4th stage of industrialization (Industry 4.0) (Marwala, 2018: 2). In another saying, the “Fourth Industrial Revolution” is begun with a new technological wave that had profound economic effects within the scope of closely-related features, such as robot dexterity, machine learning, processing power, and sensor capabilities (Ooi & Goh, 2019: 2).

2.2 Characteristics of Artificial Intelligence

Artificial intelligence, which is used to express the techniques that render the machines “smart”, make use of automation by developing or reproducing the human intellect to improve the analyzing and decision-making capabilities of machines and enable them to perform research and implementation. It catalyzes structural transformation in various industries, offering the managers unprecedented opportunities and tools to facilitate the complexity of decision-making. Besides, it allows otherwise complicated and time-consuming tasks to be completed more effectively and efficiently (DDAIT, 2018: 1818–1819).

The concept of artificial intelligence is a concept that refers to information systems inspired by biological systems and is accepted as an umbrella term involving several technologies such as deep learning, machine vision, natural language processing (“NLP”), and machine reasoning (AIR, 2018: 1). Artificial intelligence is divided into two. The first one is a reliable artificial intelligence (deep learning). This intelligence is implemented by imitating the human brain. A technology that can think like a human is aimed. The second one is weak artificial intelligence (machine learning). This intelligence is, though, the one that performs predetermined movements based on rules (Yüksel, 2018: 591; Zorluel, 2009: 308).

Artificial intelligence is a kind of computer program. It is a program that uses the situations affecting the sensory organs, such as an image, sound, touch, hears, smell, or taste, as an input through the sensors. The inputs are processed and evaluated algorithmically and transformed into a movement or a thought in the long run. Meantime, the samples are matched; the research is conducted,

the reasoning is made, and thus the learning activity is performed (Yüksel, 2018: 592). Large amounts of data are processed quickly and accurately using the transactions carried out via algorithms within the scope of artificial intelligence. Humans have been replaced by artificial intelligence programs owing to the natural speed, reliability, and scalability of algorithms (Ooi & Goh, 2019: 3).

2.3 Difference between Artificial Intelligence and Robot

Artificial intelligence does not mean a robot. While artificial intelligence is a software, a robot is an object, and some machine made up of mechanical parts. Not all robots have artificial intelligence. There is not even such a rule claiming that artificial intelligence exists in robots only (Yüksel, 2018: 593). The robots are the mechanisms capable of managing themselves, moving independently, and performing specific tasks assigned to them (Zorluel, 2009: 309). Robots can walk, perform their jobs, and have artificial intelligence to make better decisions. Even though the automation systems (Industry 2.0) are thought together with artificial intelligence, they are entirely different from artificial intelligence, too. For example, when traffic lights were introduced, they replaced the traffic police. What's more, also the term "robot" was used for traffic lights in South Africa. However, that does not necessarily mean that traffic lights can be regarded as artificial intelligence (Marwala, 2018: 2). The Google search engine is a kind of artificial intelligence, but it is not considered a robot. As you search through the Google search engine, Google first detects the subject being explored. Once it detects the topic, it carries on the process of reasoning thanks to its algorithms, by using the information it learned previously and presents the most relevant websites to the user in a hierarchical manner. In this way, Google fulfills the perception, learning, reasoning, and deduction processes of intelligence. However, that does not necessarily mean that it can be considered a robot (Zorluel, 2009: 309).

So, based on the reasons mentioned above, the report on "European Civil Law Rules in Robotics", which was issued by the European Parliament Policy Department for Citizens' Rights and Constitutional Affairs, stated that a smart autonomous robot was required to possess the following characteristics (ECLRR, 2016: 8):

- (a) Ability to move to utilize the sensors and/or by analyzing and using the peripheral data;
- (b) Self-learning;
- (c) Use of physical support;
- (d) Able to keep up with the environment owing to its movements and behaviors.

2.4 Possible Effects of Artificial Intelligence on the Future

In parallel with the rapid developments in artificial intelligence, it began to be used in more and more fields. It is highly likely that artificial intelligence will be used more widely in the future. Moreover, discussions began on where certain professional groups today would end up. While the technological developments in the 1980s and 1990s enabled the employees to speed up and carry out their works comfortably, recent developments began to replace the employees by machines or robots. Technological progress has increased so much so that there was nearly no need to employ qualified personnel, apart from the limited number of trained staff in charge of monitoring the automation system. Less and fewer qualified staff was used, and also a decrease was observed in the name of the entire team employed. Furthermore, the level of wages further reduced as more unqualified employees were recruited (Korinek, 2019: 2–3).

The market size of artificial intelligence globally is approximately \$6 billion, according to the gross value added estimates as of 2016. This figure is expected to rise to \$60 billion, with a 10-fold increase by 2025 (AIR, 2018: 3). Today, artificial intelligence has begun to be used widely in transport, education, employment, defense and security, health, virtual reality and virtual assistant, internet of wearables and objects, commercial intelligence, and robotization. Also, artificial intelligence lends substantial support to painting, story writing, and scripting, composing, computer programming, filmmaking, recipe making (AIR, 2018: 5–12). According to the 2017 Statistical Report on Internet Development in China, 2,542 artificial intelligence companies worldwide have come into operation. 1,078 of these companies are based in U.S.S, and 592 are in China (Huang Z, 2018: 1819). Therefore, it will be fair to say that artificial intelligence will be seen in many more areas in the near future.

Therefore, with all these developments, it is clear that the legal status of artificial intelligence is used instead of humans.

Because it is important to determine the status of artificial intelligence (or not) in life and especially in-laws. The assessment of the state of artificial intelligence in legal, financial, social, and even political life should be discussed internationally.

3 Taxation Size: To Be or Not to Be...

In order to put an answer to the question “can artificial intelligence be taxed?”, it is necessary to set forth its essence in terms of fiscal and legal sciences dealing with tax as a profession. In this context, it will be appropriate to determine the status of artificial intelligence against the externality theory in terms of public

finance and to determine its essence and status in terms of the law, so that its taxation aspect can be adequately addressed.

3.1 Artificial Intelligence in Terms of Externality Theory

The reflection of technological developments manifested itself under two headings. Firstly one is the increase in the amount of production. As a result of technological progress, the amount of output in the economy has increased, and especially the businesses that had innovation policies have benefited significantly from this deal. Secondly, technological development has led to the fact that the share of income received from the economy was distributed again. These new developments also referred to as the sharing economy, have influenced the way the funds are exchanged between the persons (Korinek & Stiglitz, 2017: 6). Technological improvements have significantly contributed to the increase of efficiency, reduction in the cost of operational transactions, and facilitation of data transfer to/from machines (Kavoya, 2018: 52). Nevertheless, technological revolutions are also regarded as the cause of the mass replacement of human labor, which has been restored by technological advances (Ooi & Goh, 2019: 4).

Public finance has faced two fundamental problems in the face of these technological developments. First, the market mechanism has lost its production efficiency upon the inclusion of information technologies. The firms producing financial information have started to steer the economy by creating a monopoly effect on the one hand and started to change the useful point of demand with high prices by guiding the consumers in this direction, on the other. At this point, it is recommended that the public sector establish a fund for the creation of information technologies and allow individuals to access them at affordable prices. The second main problem affecting public finance is the intensive use of these public funds by the private sector. As an example, when Steve Jobs designed iPhone, U.S. Defense, Advanced Research Projects Agency, had already been established. This agency could not have outsourced (even if it wanted) the goods with a design, which could not yet be imagined by visionaries like Steve Jobs. And that began to restrict the areas where effective results could be achieved with the public investments made in the sources of information (Korinek, 2019: 6).

According to some approaches, the development of artificial intelligence and AI robots made it possible to use artificial intelligence in areas where humans cannot obtain efficiency or involve the robots or mechanisms with artificial intelligence in dangerous works. This is described as a positive externality. Whereas those with other approaches suggest that artificial intelligence, which is capable of developing their skills and mimicking intelligent behavior, can increase

unemployment, as it will replace humans. Those that have the second approach argue that AI robots must be taxed or a tax must be imposed on the robot (AIR, 2018: 26). The idea that artificial intelligence will affect employment negatively forms the basis of the need for taxation. Although it was known that technological revolutions in the previous years also contributed to unemployment, a current wave of automation caused in parallel with Industry 4.0 is likely to be more destructive than the previous ones for several reasons. Previous technological innovations did not eliminate the need for human labor in operation and control technology. The autonomous nature of the existing technologies removes the need for human intervention, thus threatening the place of social work to a great extent. In addition, unlike previous technological innovations that are limited in terms of applicability, the autonomous technology is a general-purpose technology that has a broader set of various capabilities, including physical action, information processing, etc. So, inevitably, it has the potential to have a devastating impact on a broader range of sectors. Due to the speed of development in automation technology, it is stated that there is hardly time for the governments to respond to automation. Otherwise, the consequences can be severe unless quick actions are taken (Ooi & Goh, 2019: 5).

While the Bank of America's Merrill Lynch argues that artificial intelligence will save \$9 trillion in employment costs by 2025, a report by the World Economic Forum estimates that 5.1 million people will lose their jobs due to artificial intelligence automation by 2020. Deloitte, a consulting firm, claimed that thirty-five percent of people employed in the UK were at risk of layoff due to improvements to be made in automation systems over the next ten to twenty years (Abbott & Bogenschneider, 2018: 153). Therefore, it is stated that as automation and artificial intelligence prevail, productivity will increase, and new businesses will emerge. Still, on the other hand, unemployment and inequality will inevitably be experienced (Abbott & Bogenschneider, 2018: 154). Hence, job losses, increasing inequality, and a decrease in tax revenues are seen to be inevitable (Mazur, 2018: 6–17).

On the other hand, it may not be possible for an artificial intelligence automation system to create an equal effect in all sectors. It will be difficult for most of the businesses within the same industry or occupational class to switch to new businesses if they are highly sensitive to automation. Put it differently; a radical restructuring of the company or business policy will be needed, even though it is not required at the moment. It is necessary to take policy measures to reduce the impact of automation on specific sectors or occupational classes. In some industries, technological developments can make it plausible yet and financially demanding for companies to automate their entire line of business entirely.

A significant problem will arise if the workers doing these jobs do not need to have the skills to allow them to perform alternative performance typically. For instance, the effect of self-driving trucks on truck drivers makes a good example. If self-driving vehicles replace truck drivers who do not have a different job alternative, then there will be a long-term probability of structural unemployment. Therefore, it is stated that the need for intervention, particularly in such sectors, is necessary (Ooi & Goh, 2019: 5).

As a result of all these discussions, it is understood that the fact of artificial intelligence brings about either positive or negative externalities, as the case may be.

In such a case, it is necessary to clarify the taxation or promotion of machines, robots, or articles using artificial intelligence. It is also clear that a policy should be developed based on the findings of the analysis of sectors and their impact on employment. The general opinion is that artificial intelligence hurts work (Ooi & Goh, 2018: 5, Bottone, 2017: 12, Englisch, 2018: 7–8). Therefore, with the increase in artificial intelligence and the gadgets having artificial intelligence, which will affect employment negatively and replace humans, it seems to be inevitable to impose a tax or similar financial obligations. Of course, it is controversial on what or whom it will be imposed and how it should be applied. As elaborated in the following sections of the study, it has to be clarified whether it will be imposed on income or via a Pigovian tax application.

On the other hand, the decrease in the employment of real people is of particular concern to the public budgets in macro terms. Namely, if artificial intelligence starts to work instead of real people, it will lead to a decline in public revenues, as it will not be possible to realize the tax obligations collected based on social security payments and wages. That is because the employment of “real person” is what makes them be paid. However, artificial intelligence needs neither social security nor income. This result reveals that public finance will be affected, more or less, as the artificial intelligence is used widely. Therefore, even just for this reason, it can be said that a taxation study should be done regarding artificial intelligence.

3.2 Artificial Intelligence in Terms of Law

3.2.1 Should Artificial Intelligence Be Personified?

The hottest debate in legal terms is whether artificial intelligence needs to be given legal personhood is given. In the legal system, personhood is divided into two: real and legitimate. For individuals not having legal personhood, solutions are produced by making special regulations in the laws. Artificial intelligence is

neither an actual nor an authorized person. So, first of all, the answer to the question, "Should personhood be given" has to be/has been sought.

The basic approach concerning the debates regarding the concept of personhood and legal status in terms of artificial intelligence, which survived today, is that artificial intelligence is an "item/tool" and should be accepted in the ownership of its producer. However, in view of the fact that artificial intelligence is increasingly a more significant part of human life and acquiring more and more humanlike features, the idea to accept them as tools or items only is increasingly being abandoned. The most striking proposal regarding the legal status of artificial intelligence is the one suggesting that "Electronic Personhood" should be granted to artificial intelligence (Leroux & Labruto & Boscarato, 2012: 61). And, that stems from the concept of legal personhood; and development of electronic personhood is discussed within the frame of the fact that artificial intelligence, which is capable of making autonomous decisions and communicating with people, should be registered in a special register. Thus it is intended that it could have some acquired and individual rights and obligations; the responsibilities of related parties (users, vendors, manufacturers, etc.) can be determined. In this way, electronic personhood, similar to the legal personhood, should be developed (Zorluel, 2009: 344).

Legal personhood is always related to individual autonomy. The question "can an artificially intelligent asset be given legal personhood?" is a matter of whether such an asset set will possess any legal rights and obligations. The essence of the legal personhood is based on the fact that whether such an asset has the right to ownership and the capacity to file an action or engage in a lawsuit (AIR, 2018: 13). What is taxed within the scope of the proposal of electronic personhood was not the robot itself but rather the companies that use it (Mazur, 2018: 18).

According to an argument put forward as to whether or not the legal entity (personhood) given to the companies in the doctrine can also be given to the artificial intelligence; it is possible to establish the legal construct, which was created for the companies regarded as an essential example of fake person, for artificial intelligence, as well. On the other hand, it is also accepted that there is not an absolute similarity between companies and artificial intelligence. That is because, while the companies are considered autonomous institutions constructionally and their stakeholders decide on their activities, artificial intelligence does not have any stakeholders and makes decisions directly by themselves (AIR, 2018: 13).

From the viewpoint of the capacity to have the right and ability to act in Turkish law, many discussions come to surface. In another saying, if personhood

is recognized, then some questions have to be answered. For example, when making agreements, it will be difficult, at least for today, to find the answers to the questions such as, whether they will be a party to the agreement, get the approval of the other party and whether the intentions of AI robots are measurable (Akbilek, 2017: 227). Because, to be a “person” requires some consequences (Gözler, 2014: 179). The most moderate view, among others, put forward in the doctrine today, is the one suggesting that the operator of AI robot should be held responsible (Chopra & White, 2004: 3).

Considering some of the examples relating to the subject in the world, the studies conducted by South Korea and Estonia emphasize the idea of giving personhood to the robots. In 2012, South Korea introduced a legal regulation in 2012, restricting that humans must always control the robots and ruled out the possibility of giving separate legal personhood. On the other hand, Estonia discussed whether special regulations should be made for the robots within the scope of the Civil Law, and some proposals were made on responsibility. The most remarkable suggestion was one offering that the robots should be allowed to acquire legal personhood in a way to include also the authority to represent their owner. Aside from the ongoing discussions, according to an agreement we advocate, it is not possible to agree with the idea that robots can act since they are not autonomous enough to perform their actions and operations by their own will, i.e., without any external intervention (Akbilek, 2017: 231–232). However, the subject will be put under discussion again in the future, if we have such AI robots that can make decisions and act on their own and do not need human intervention whatsoever.

Since the assets in question are not “real persons”, it causes a dilemma as to whether it would be possible to assess them with the attributes of a “legal person”. Real persons ultimately guide legal persons, and the responsibilities can be shared with the real persons. However, there is no human intervention in artificial intelligence. On the other hand, artificial intelligence does not have a body, soul, nationality, feelings, consciousness, interests, and curiosity, nor a free will as real people do. It should be noted, however, that Saudi Arabian granted citizenship to the artificial intelligence, named Sophia, which was produced by a Hong Kong firm Hanson Robotic (AIR, 2018: 13–14). And, that is a clear indication that it does not mean artificial intelligence will not have what it doesn’t today, over time. It seems plausible in the forthcoming years that it will be possible to impose tax by giving a statue of personhood subject to the law, rather than to an artificial intelligence programmer or user (AIR, 2018: 25).

3.2.2 *Artificial Intelligence in Terms of Responsibility and Punishment*

The concept of “responsibility” is the main reason for the discussions about whether artificial intelligence should be given personhood. In particular, this subject of responsibility was further highlighted as a result of the accident that claimed the life of a 49-year-old person in Arizona, U.S.A., during the test drive of autonomous vehicles, which was carried out by UBER. So, the discussions began as to whom should be held responsible since there was no legal regulation as to whether Uber Technologies Inc. should be held accountable or whether the artificial intelligence operating the autonomous car would be held responsible alone (AIR, 2018:14). Therefore, artificial intelligence is not naturally responsible at the moment. However, it might be confusing whether it will be considered reliable as the potential operations increase over time. Moreover, given the fact that the decisions could also be appealed, in other words, the fact that it can implement its own decisions raises the issue of whether or not a legal responsibility can be assigned.

The fact that each AI robot has different autonomy levels creates problems in producing solutions regarding the law of responsibility and makes matters even worse. Do the acts, actions, or functions performed by robots result from the design and programming, or do they improve and evolve depending on the features they own? If a person guides the actions of an AI robot or has a part in its activities, then we can talk about some aspects such as a fault or intention in terms of liability law. However, it is argued that some regulations should be made under a different approach, for AI robots, which are capable of moving autonomously (Akbilek, 2017: 219–220).

Yet another point reached in these arguments is the question of whether artificial intelligence can be punished or not. It must have a bank account and pay from its account in case it is served with an administrative fine. But, artificial intelligence does not have a bank account (for the moment at least). Nor will it be eligible to open a bank account. Therefore, it will not be possible to punish it either legally or effectively. According to some recommendations on this topic (AIR, 2018: 24);

- (a) If an act of artificial intelligence requires death penalty, deleting the artificial intelligence can be an option;
- (b) If the law of artificial intelligence requires a prison sentence, it may be temporarily put out of service;
- (c) If the action of artificial intelligence requires a public service, it can be allocated to that particular the public service;

- (d) If the act of artificial intelligence requires an administrative fine, the user or creator of that artificial intelligence may be served with a fine. However, this is controversial in terms of the personality principle of penalties.

Criminal and financial responsibility is closely related to giving personhood to artificial intelligence. In general, criminal liability belongs to natural persons, while financial responsibility belongs to natural or legal persons (Gözler, 2014: 223). If artificial intelligence is to be given personhood and responsibility is to be assigned accordingly. Its results must be taken into consideration because artificial intelligence can be served neither with imprisonment nor a monetary fine. Hence, if a criminal or financial action is to be considered for an act of artificial intelligence, it should be the person who is the creator/operator of the artificial intelligence that must be held responsible. Breaking off the relationship between artificial intelligence and its creator/operator may lead to an uncontrollable point where it will be impossible to find the wrongdoer (offender) and impose a sanction. Although it can be argued that artificial intelligence can take an autonomous decision, and thus it must be punished, the fact that no action can be taken against it, either criminally or effectively, can lead the argument to a meaningless point. What is more, in our opinion, suggestions such as taking actions to delete and/or remove artificial intelligence (AIR, 2018: 24) does not make any sense.

3.2.3 *The Fate of Copyrighted Work Produced by Artificial Intelligence*

It is also argued in legal terms how it will be dealt in case a copyrighted work is produced by artificial intelligence produce. If artificial intelligence provides any task which requires copyright, such as painting, story, and scriptwriting, composing, computer programming, and filmmaking, artificial intelligence, which is not a real person, does face the same problem of granting personhood. Even though the real person takes the first step in creating the copyrighted work, it is still unclear how to determine the actual owner of such copyrighted work as artificial intelligence is involved in and affects the process of creation. The same applies to all transactions that create intangible rights. Does the copyright belong to artificial intelligence or the real person who creates it? (AIR, 2018: 17).

In one of its decisions, the U.S. Copyright Office decided that works produced without the contribution of any creative people could not be regarded as works. English law recognizes the author as the person who makes the necessary adjustments for the creation of the work. In this case, computer-generated literary, dramatic, musical, or artistic works are not considered works. As in the U.S. legal system, the fact that the products of artificial

intelligence are not accepted within the scope of copyright, subjected to direct public use, is seen as an obstacle preventing the progress of the works from being carried out in this field (Zorluel, 2009: 325–326). On the other hand, the products that can be considered an action, according to Law on Intellectual and Artistic Works in Turkish Law, can only be produced by humans. In other words, the owner of the works created by artificial intelligence may not be artificial intelligence. However, it is stated in the doctrine that this situation is not sustainable.

3.3 Discussions on Taxation Regime

As mentioned in the previous chapters of the study, how to tax the artificial intelligence in terms of finance theory and legal science, and what methods to use in taxation per the existing rules, if artificial intelligence is to be taxed was discussed. The subject will be considered under this heading by also including our opinions based on these discussions.

3.3.1 In Terms of Income Tax

3.3.1.1 Principle of Financial Power and Identification of Taxpayer: Artificial Intelligence? Or Its Creator/Operator?

The majority of the discussions on the taxation of artificial intelligence are by and large on whether or not artificial intelligence can be identified as a taxpayer. This issue has been addressed both in terms of giving personhood to artificial intelligence and whether it should be vested with financial power. According to positive law, a person must be a real person to be an income taxpayer. Besides, considering the principle of financial power as per the constitutional provisions, it must also have a taxable income.

Real persons, who obtain the elements making up the income, submit tax returns according to their particular circumstances and qualifications, -or even if they do not-, they are (often) taxed through withholding. The taxes to be paid are assessed by taking the specific situations of real people, such as disability, marital status, number of children, education and health expenditures, donations, and charities. It is unclear yet whether artificial intelligence will make such expenditures as real people do. In other words, artificial intelligence does not make donations and give charities, nor does it spend on health and education. And, that raises the question of whether a certain fee can be set and accepted as a levy for the expenses that are not made. What is more important above all is how to impose a tax following the principle of fiscal ability. In other saying, do robots have a fiscal ability?

Since artificial intelligence is not a real person, it cannot be a taxpayer for income at present. However, if artificial intelligence were to be given personhood and this personhood can be included in the taxpayer group in terms of income tax, and it can be taxed naturally as soon as it acquires one of the income elements. In this case, it rises to different questions. For example, if artificial intelligence is to be taxed, it cannot be determined how much of the income will belong to artificial intelligence and how much to the creator/operator. Also, whether the user/creator creates the added value or it will be attributed entirely to artificial intelligence. For today, the general approach is to tax the income earned by creators/operators (AIR, 2018: 25). Since the real persons declare their salary as per the income tax based on assessment upon declaration, it is also important how to subject the robots to this regime in this scope. One of the arguments outlined in this context is to grant AI robot a “special status”. It is proposed to grant new legal personhood as per the tax law and shape up the system accordingly. In this context, the robot can be regarded as a separate person. A system called “electronic payment power” can be created. The primary basis of those who claim that robots should be taxed in this way is that robots replace humans. Robots’ income is considered as a fee and can be withheld. Besides, if an AI robot is regarded as a separate taxpayer, it will be highly likely to cause double economic taxation in case the income of the robot and its owner is taxed separately. In this case, a result, as in the profit shares, will eventuate (Engelisch, 2018: 4–6).

In our opinion, it might be undesirable to establish liability in terms of tax law unless it has a criminal and financial responsibility, whether or not artificial intelligence is given personhood. Primarily, it is probable that artificial intelligence can commit tax misdemeanor and revenue offense as it might mimic human behaviors or display similar acts. In this case, it may not make any sense to imprison artificial intelligence or impose a fine for loss of tax/fraud (irregularity). Although it is considered for a moment that a liability similar to the criminal liability of a legal entity may be given in France or Belgium, it is more appropriate to designate the creator/operator as its legal representative. Otherwise, tax authorities may have to bear the consequences of crimes or offenses committed by artificial intelligence. If its creator/operator is specified as the legal representative, there will be a real person to address in case of misdemeanor and crime. As a result, instead of establishing liability for artificial intelligence, it will be a good practice to accept its creator/operator as the taxpayer and attribute the income earned to the real person. In this way, the criticism of double taxation will be eliminated.

3.3.1.2 *Assessment of Income and Base: What Type of Earnings?*

One of the essential aspects under discussion in this context is how to determine the income earned/to be received by artificial intelligence and what the type of income will be. How will the income earned by an AI robot be determined?

The studies on taxation of artificial intelligence suggested the idea that the income earned through artificial intelligence should be considered as the continuation of the business of its creator/operator. Put it differently; also, the income generated by artificial intelligence, which is created/used by a business earning commercial income, should be considered commercial earning. In such a case, taxation shall be made based on the business under the applicable provisions (AIR, 2018: 25). Within the scope of this possibility, all incomes earned by artificial intelligence will be regarded as the commercial receiving of the business.

According to another view, if the robots of artificial intelligence are classified, the income should also be determined accordingly. When artificial intelligence or AI robot is classified according to the intended use as “industrial artificial intelligence/robot” or “serving artificial intelligence/robot”, the income earned in such a scenario can also be accepted as “commercial earnings” or “wage/self-employment earnings”. For example, a service robot is a robot that does useful work for people or tools/equipment, except for industrial automation. On the other hand, a personal service robot or a service robot for personal use is a service robot used for non-commercial purposes or purposes other than commercial use. Domestic servant robots, automatic wheelchairs, own mobility assistance robots, and pet exercise robots are the examples, to name but a few. A professional service robot, or a service robot for professional use, is a service robot used for a commercial task, which is usually operated by a duly trained operator. Examples include cleaning robots for public places, the delivery robot in offices or hospitals, fire fighting robots, rehabilitation robots, and surgical robots in hospitals. In this context, an operator is a person assigned to start, oversee, and stop the intended operation of a robot or a robot system (Bottone, 2017: 4).

According to another proposal, if a robot is to be taxed, then the rate of income tax should be based on the possible wage it could have earned had it been a real worker. According to this proposal called “robot income tax, the “economic advantage” obtained by the employer through the use of robots instead of workers can be considered as the criterion (Guerreiro & Rebelo & Teles, 2017: 4). In that case, the robot’s ability to pay can be regulated by law as the technology evolves.

As can be seen in the arguments above, it is unclear how to assess the type of income if artificial intelligence is to be held liable for tax purposes. As we

mentioned in the previous section, that confirms the fact that rather than establishing liability for artificial intelligence, the creator/operator has to be determined as the taxpayer, considering the current technological and legal circumstances. If the creator/operator is accepted as a taxpayer, we think that it will be appropriate to consider it a commercial earning. As the use/operation of artificial intelligence requires capital, organization, and less labor, this type of gain will be appropriate. Of course, different alternatives can be considered in case an income is earned by leaving it at the disposition of others. For example, with the regulations to be made under Article #70 of Income Tax Law, it will be possible to accept it as real property income, considering that AI robot is rented to another person.

On the other hand, if a liability is established for artificial intelligence, the issue will become more complicated. It is uncertain to determine what kind of income the artificial intelligence earns as the actual taxpayer. But still, if a profit is to be attributed under current circumstances, it can be possible to accept it as “commercial earning” or “wage” and to make special regulations in the law.

3.3.1.3 Should Artificial Intelligence Be Considered a Workplace?

One of the points under discussion about taxing artificial intelligence and AI robots is seen as a problem under international tax law. Because it is evident that it needs to be clarified where it will be based or considered to be, in terms of “location”. For example, it should be made clear who will be using the taxation authority in cases where the creator/operator resides in country X, but artificial intelligence or AI robot operates in territory Y (Englisch, 2018: 12–13).

The workplace, which forms the basis of taxation as a place (location), is defined as the point of affiliation, which allows commercial earnings to be affiliated to the taxation authority of the source country where they are earned (Yaltı Soydan, 1995: 131). The subject of “workplace”, which is one of the affiliation rules in the exercise of taxation authority, is the most important basis through which the tax administrations can impose a tax on corporate income taxpayers and commercial income taxpayers. Those who have a business within the political boundaries of a country shall be subject to the taxation regime of that particular country. The first aspect considered in the implementation of the principle of residence, which is the basic principle in taxation, is whether the person/corporation has a workplace (Biyan & Yilmaz, 2018: 17).

Artificial intelligence can deliver services either online or at a fixed location, as applicable. Therefore, it would be more appropriate to assess a case by case basis. For instance, since an artificial intelligence offering online services will be

indifferent to a website, it should be evaluated as the businesses operating via a website, in which case the taxation problems will manifest themselves against the artificial intelligence (Biyani & Yilmaz, 2018: 34–36). On the other hand, artificial intelligence affiliated to a fixed location, e.g., an AI robot can be taxed as a fully obligated or limited taxpayer in the country of residence according to the principle of residence or source. Consequently, assigning a status to artificial intelligence in terms of a workplace is one of the main problems caused by the digital economy. Rather than producing national-wide solutions, it would be a good practice to include, address, or refer the matter in tax treaties, to get more proper and practical results.

3.3.1.4 Discussions on Copyright

The point of whether artificial intelligence can be a copyright owner also appears in its taxation, as well. Even though artificial intelligence is considered to have the ability to mimic intelligent behavior and process it on its own, it is ultimately made up of computer algorithms and software. And, if that is accepted as the “right to use” for artificial intelligence programmers, then the income earned by artificial intelligence needs considering as copyright. On the other hand, when a profit is obtained by assigning the copyright, it is argued that it can also be accepted as a technical service fee (AIR, 2018: 25–26).

In Turkish law, FSEK does not allow the persons, other than real ones, to be a copyright owner; therefore artificial intelligence can't be copyright owner in Turkey today, as per the positive law. On the other hand, although it may be considered that the artificial intelligence should be given copyright, it seems more appropriate to accept the owner/operator as the copyright owner if a copyrighted work is produced by artificial intelligence. Since it is not clear how all will use the rights that copyright will bring to its owner and how it will get the earnings it will acquire owing to such reasons. Because of the creator/operator of artificial intelligence benefits from earnings. If it is the artificial intelligence that produces such work, then it is the creator/operator who is a real person that creates artificial intelligence. Then again, if the criminal and financial responsibility lies with the creator/operator, in that case, also the creator/operator should be considered a copyright owner. And, the income earned will be taxed as self-employment income.

3.3.1.5 In Terms of VAT

It will be inevitable to use the robots as serving gadgets as they were employed instead of real persons. Robots provide several services, such as legal or financial advice, medical assistance or cleaning services, etc. In this case, we come up

with the question of whether or not calculate the VAT, which is based on goods delivery and execution of service (Englisch, 2018: 17–8).

According to an opinion, value-added tax for activities carried out by robots may be subject to VAT by considering them “service”, as in the case of self-employed traders. However, it is stated that it may not be easy to figure out whether the fee charged by an AI robot is accurate (Oberson, 2017: 256–257). If a robot is used to produce goods or services, they are probably taxed both as intermediate goods and final goods, so it is stated that there is no need to recalculate VAT to avoid the risk of double taxation. However, if the robots are legally considered a “person” with legal and financial capacity, it will be required to levy VAT on the service related to their activities. All proposed solutions are highly controversial in terms of globalization and, consequently, easier circulation/mobilization of capital, the emergence of tax competition between jurisdictions, etc. Therefore, since physical capital tax implies higher costs for national companies and impairs their global competitiveness, it can be stated that the design of a robot tax requires a comprehensive analysis by taking the arguments, especially regarding international taxation at OECD and UN (Bottone, 2017: 17).

Since it is evident that the delivery of goods and the execution of the services are included in the subject of VAT, it is clear that the sale of a service or products carried out by artificial intelligence should be subject to VAT in the case of commercial, agricultural or professional activity as well as imports. The VAT will be calculated during the sale of goods or services, which is carried out by an artificial intelligence operated by its creator/operator, and the taxpayer will be the creator/operator. However, if liability is assigned to artificial intelligence, there might be some problems in the performance of the formal obligations of artificial intelligence, even if the VAT calculation of artificial intelligence is programmable. For example, lodging tax returns, in which case its creator/operator fulfills the formal liabilities. In our opinion, it will not pose a problem whether or not artificial intelligence collects VAT or whether the payment is received in full amount since the fees will be calculated both by computer programs and processed through the banks or financial systems. But, some problems can be experienced in case cash transactions are accepted in such situations.

3.3.1.6 In Terms of Environmental Tax (Pigovian)

The widespread use of artificial intelligence and its possibility to affect employment negatively highlights two issues, in particular. First, there is the possibility of a decrease in income tax, which has a significant share in tax revenues in almost several countries. As robots replace human beings, the taxes imposed on them will likely lead to a reduction in tax revenues. The second is to face the fact

that robots will be employed and thus to train those persons, mainly working in such businesses or jobs that do not require any skills and talents. As a result, the need for public resources will increase (Bottone, 2017: 2). The European Parliament stated that it would be more appropriate to use the income that is generated, to re-train the unemployed workers if it would be necessary to impose a tax on a robot's work or define a wage for it. Therefore, it was pointed out that sectors, which are at the most risk due to the employment of robots, should be identified (Bottone, 2017: 12). In case an AI robot or automation system is used, it is proposed to apply a high tax rate or impose automation tax or similar tax for businesses with automation. On the other hand, it is also necessary to use tax relief or incentives to companies employing real persons (Abbott & Bogenschneider, 2018: 168–173).

The social costs caused by automation create a negative externality as workers or communities cover them. The causal relationship between the transition of the firms to automation and the resulting negativity creates a *prima facie* situation, in order for the government to intervene by deterring or punishing such automation actions that generate an externality. Such an intervention may return to the party to alleviate such externality as a Pigovian financial obligation. In this case, such tax would impose an automation tax, which will apply to all technologies forming the current wave of technological innovations, on the companies that automate their systems or equipment involved in the production processes (Ooi & Goh, 2019: 6). This tax, which is proposed in the doctrine as a robot tax, is an automation tax and aims to impose a tax on businesses that prefer to operate automation systems by switching to mechanization, instead of employing people. In this context, it serves as a sort of balance (Mazur, 2018: 18).

The base of the automation tax can be measured by the total monetary coverage of any decrease in the number of layoffs or employee wages. In addition, this can be easily measured according to financial data, payroll, or other company records. The size of the tax base measured by the layoffs attributed to automation will be proportional to the externality of dismissal based on automation. At this point, however, it is not clear how to assess other possible situations, such as reduced operating conditions or productivity improvements not related to automation, when determining the tax base. It also seems necessary to take into account the analyses on whether the time between automation and layoffs is short enough and whether the automated tasks are similar enough to those performed by those who are discharged (Ooi & Goh, 2019: 11).

South Korea is the first country in the world to levy a robot tax. The country in question started to impose robot tax (AIR, 2018: 26) as of August 2017. However, this is not sufficiently considered regarded as a robot tax. This tax in question,

which is widely considered as an application that restricts the incentives for the transition to the automation system, is an obligation which is imposed on the corporate taxpayers investing in automated machines and paid in an amount set between 3% and 7% of the investment made. Then, South Korea decreased these rates by two points (Abbott & Bogenschneider, 2018: 149).

One of the concrete proposals made in the doctrine is the application of reverse depreciation. It is argued that if the investment made by the taxpayers who invest in automation affects to eliminate employment, the depreciation rate of the investment made will be kept low, not allowing a great majority of the capital expenditures to be deducted from the taxable income. On the contrary, if such investment made is supporting the employment, then in such a case, support can be given, and incentives can be provided by keeping the depreciation rate high (Ooi & Goh, 2019: 18–19).

4 Conclusion

The focal point of discussions on taxation of artificial intelligence emphasis on the negative impact it may have on employment due to the negative externality that it creates and on the issue whether or not it should be taxed due to possible losses of revenue in the budget. Although there are opinions that artificial intelligence should be given legal personhood and accepted as a taxpayer -as we have tried to elaborate in the study- it is not a proper approach to provide artificial personhood and assign liability to artificial intelligence, at least for now.

In our opinion, whether or not an entity with artificial intelligence is given personhood under the existing technological and legal conditions, it may be inconvenient to establish liability in terms of tax law unless it has criminal and financial responsibility. It is, of course, probable that artificial intelligence can commit tax misdemeanor as it might mimic human behaviors or display similar acts. In this case, it may not make any sense to imprison artificial intelligence or impose a fine for loss of tax/fraud (irregularity). Although it may be considered, for a moment, that financial responsibility may be assigned, it would still be more appropriate to appoint its creator/operator as its legal representative under the current circumstances. Moreover, it is unclear, in the current system, how to determine the type of income if liability is to be assigned to artificial intelligence. It would be appropriate to establish the creator/operator as the taxpayer and accept the income earned as commercial earning, rather than creating a liability for artificial intelligence. Likewise, in case a copyrighted work is produced by artificial intelligence, yet again it will be more appropriate to attribute such income to its creator/operator.

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