Robot Taxes: The Rise of a New Taxpayer

The author considers various issues that arise in relation to the taxation of the emerging phenomenon of artificial intelligence, or AI, and robots. In this context, the author suggests solutions to these problems. Eventually, taxing robots as such could also be justified to safeguard the integrity of the tax system.

1. Introduction

The debate on the introduction of robot taxes emerged as a notable topic in 2017. While the concept had already been discussed by scholars and policymakers,1 it was then that the public started to pay much more attention to this idea, following a famous interview with Bill Gates on 17 February 2017.2 Since that time, the concept has evolved and various proposals have been advanced. Different models of taxes on robots, or on artificial intelligence (AI),3 are now under serious consideration and evaluation. As a result, specific taxes or levies targeting robots, albeit in an embryonic form, have been introduced or discussed in some countries already.4

However, the proposals have different features and various justifications. In order to evaluate robot taxes from a policy standpoint, it appears to be crucial to view better their underlying purposes and structure. As the author demonstrates, robot taxes may address different public policy goals. Nevertheless, the numerous critics of robot taxes sometimes fail to consider these differences.

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3. In this article, the author uses the word ‘robot tax’ in a broad sense, which encompasses not only robotics, in a strict sense, but also AI more generally.

4. For instance, South Korea has implemented in 2017 a limitation to the automation tax credit, which was sometimes described as a robot tax, even though this characterization appears misleading, and in the United States, taxes, often excise taxes, on autonomous vehicles have been proposed or adopted — see R. Kovacev, A Taxing Dilemma: Robot Taxes and the Challenges of Effective Taxation of AI, Automation and Robotics in the Fourth Industrial Revolution, 16 Ohio St. Tech. L. J. 1., p. 203 et seq. (2020), available at https://kb.osu.edu/bitstream/handle/1811/91833/OSTLJ_V16N1_182.pdf?sequence=1&isAllowed=y (accessed 22 June 2021).

This article intends to clarify the debate. At the outset, the article provides a reminder of the general justifications arguing in favour of introducing robot taxes (see section 2.). Next, an overview of the various proposals to tax robots or AI, and their specific justifications, is presented (see section 3.). This description starts with a reminder of the necessity to distinguish two types of robot taxes (see section 3.1.), followed by an analysis of the essential features of taxes on the use of robots (see section 3.2.) and on robots as such (see section 3.3.). The author shows that taxing the use of robots may, despite numerous critics, still represent an interesting solution, at least for short and mid-term purposes. However, in the long term, the author believes that taxing robots as such will appear to be more and more necessary. The road is long, and the relevant measures would be difficult to implement, but, as the author shows, together with the technological development, a solution could be feasible. In addition, with the progress of AI and robotics, the introduction of “smart robots”, including algorithms, as new taxable persons, could be justified to safeguard the integrity of tax systems and to counter new forms of tax avoidance. Subsequently, the overview of the robot tax categories, and their justifications, permits clarification of the difficult definition of the concept of robots (see section 4.). Then, the author reminds readers that, in order to arrive at a successful solution, international coordination is necessary (see section 5.). The article ends with some conclusions in section 6.

2. General Justifications

The debate on robot taxes is linked closely to the effect of the development of AI on the economy and on human workers. The consequence of AI for human labour is very controversial and has been discussed at length in the past by economists and policymakers. Some, probably the majority today, still believe that AI will create new jobs and that humans will eventually collaborate with AI.5 Accordingly, as in past industrial revolutions, the economy as a whole will be better off. Other analysts are more pessimistic. A recent publication, based on existing estimations pertaining to the impact of AI on the labour market, predicts the following two potential scenarios: (i) the disappearance of jobs and, therefore, mass unemployment; or (ii) a change of skills, resulting from newly created jobs.6 Other studies take a more intermediate position by arguing in favour of a robot tax only in the short term, but not in the long run.

5. See, for example, L. Summers, Robots are wealth creators and taxing them is illogical, 5 Mar. 2017 The Financial Times Limited 2021.

to protect current routine workers. In their quantitative analysis, these authors distinguish between routine and non-routine work, in which robots are complemented to non-routine workers and substituted for routine workers. Under this model, taxing robots reduces the incentive to acquire non-routine skills. According to these authors, an optimal tax on robots should be introduced, for three decades, at a rate of 7% in the first decade, 3% in the second and 1% in the third. Once the initial generation of workers has retired, the optimal tax should be reduced to zero.

In the author’s opinion, there are reasonable arguments on the economic impact of AI in favour of all of these theses. What appears to be true is that many human workers are being, and will be, replaced by autonomous machines. Many of these workers will not be in a position to adapt, in an adequate time, to the new economy. In addition, should the pessimists prove to be right, many countries would face a huge financing problem, as income taxes, including those on wages, are one of the main sources of revenues for many states, notably to cover the costs of social security systems. A reduction in labour income would also affect consumption and, therefore, the resources derived from value added tax (VAT) and/or goods and services tax (GST) or other sales taxes. Consequently, the author considers that it is necessary to analyse and develop a model of taxation of robots. It is well known, as the various discussions regarding a system of taxation of digital services have demonstrated, that the acceptance of a new and controversial model of taxation can take a considerable amount of time. In this respect, justifying a tax on robots relies on the necessity to find additional resources for the state to compensate for the losses resulting from the reduction in labour income.

Robot taxes can also be justified as a policy tool. Almost everybody agrees that the development of AI will exacerbate the inequality in the distribution of wealth. It could be that the world will end up with an increasing group of underpaid or unemployed class of workers, compared with a smaller group of skilled workers who are better adapted to collaborate with robots. In addition, the owners of the assets or the intellectual property (IP) in relation to AI could obtain a disproportionate share in the reallocation of wealth. From this perspective, a tax on robots could be justified as a tool either to restrict the use of robots in favour of human workers or, at least, to internalize the social costs linked to unemployment. Again, from this standpoint, the robot tax would be more a policy measure, albeit perhaps transitory, than a tax designed to finance the needs of the state.

In this regard, the opponents in principle of robot taxes should at least recognize that the use of robots is already subject to tax under the existing tax system. First, as production factors, profits emerging from the use of robots are part of the taxable income or profit tax base of the enterprise or corporations. Second, the use of robots by enterprises is subject to VAT, as part of the value added incorporated in taxable supplies of goods or services invoiced to customers. Accordingly, robot taxes imposed on the creation of value resulting from the use of automation should be designed in harmony with the existing tax system. Some critics view robot taxes as new levies, which, by definition, should have a deterring or distortionary effect on the existing tax system and would deter innovation. This position is not necessarily justified. Admittedly, the implementation of robot taxes will require coordination with existing taxes already targeted at AI and, notably, rules to avoid potential double economic taxation. However, it should be emphasized that the discussion on robot taxes relies on a new conception of the tax system that must address the development of AI, combined with the appearance of new technologies, capable of autonomous behaviour with a potentially significant effect on the market and customers or users worldwide.

3. Analysis of the Various Models of Robot Taxes

3.1. Taxing robots or their use

The idea of taxing robots, as the lively debate among scholars or policymakers reveals, appears to be quite controversial. Some critics, however, seem to rely on a misconception of the project. As is demonstrated in sections 3.2. and 3.3., there are many different forms of “robot taxes”. The critics, in order to be more persuasive, should consider, at least, the different essential features of the taxes subject to discussion.

First, when the issue is about taxing the use of robots, the analysis of the taxes and their justification are quite different than when considering taxing robots as production factors of an enterprise contributing to the realization of profits or to restrict or internalize the social costs occasioned by the use of automation, thereby replacing human workers. In the first case, the tax is conceived as a tax on profits of the enterprise, with a fiscal purpose, while, in the second, it corresponds to a so-called Pigouvian tax, designed, like a regulation, to create a deterring effect (effet d’incitation) for the entities or persons subject to tax.

As a result, the economic and legal justifications of such taxes differ totally, as, in the second case, the tax is introduced as policy tool, being similar to an administrative regulation with a deterring effect, while, in the first case, the tax has a predominantly fiscal component, being part of the

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global tax system. Notably, the validity of a Pigouvian tax should be analysed under the principle of proportionality by comparison to a direct measure targeting the relevant behaviour subject to tax – in this case, the substitution of human labour with automation.

Second, the perspective completely differs when taking robots as such is considered, i.e. as a new form of taxpayer. Currently, robots are not legal persons. Contrary to corporations, or other forms of legal entities, they are not (yet) regarded by the legislator as taxable persons. Sophia has been given Saudi Arabian nationality, but to the author’s knowledge, she is not a taxpayer. In the absence of characterization as a legal entity, or, at least, having a tax capacity, robots do not have an ability to pay tax and, therefore, may not be subject, as such, to a revenue tax or some other types of taxes relying on this constitutional principle. This situation does not imply that a tax on robots as such is impossible. On the contrary, the author demonstrates further in section 3.3, how such a tax could be implemented in the future. In the author’s view, with the development of technology taken together with the autonomy of AI, taxing robots as such could not only become feasible, but even a recommendation. However, the point is that there is a crucial difference in the analysis, as, currently, the only models that could be implemented are taxes on the use of robots. In this case, the ability to pay usually belongs to the owners or the users of automation as a production factor of the enterprise. In order to provide a clear overview of the concepts of a robot tax, following the principle of ability to pay, it appears to be crucial to distinguish between the following two categories: (i) taxes on the use of robots (see section 3.2.); and (ii) taxes on robots as such (see section 3.3).12

3.2. Taxes on the use of robots

3.2.1. Profit taxes

Under this proposal, enterprises would be subject to tax on the imputed income arising from the use of robots instead of human workers. By using AI, the enterprise obtains an economic advantage by avoiding the salary costs linked to human workers. While salaries are deductible as business expenses, the costs of purchasing AI and robotic infrastructures benefit from a different tax treatment, i.e. immediate or accelerated deduction. Furthermore, in general, only the salaries paid to humans are subject to social security contributions.

The author has advocated such a solution based on reasoning similar to an economic definition of income, which should include the imputed income, like imputed rent to housing similar to an economic definition of income, which is usually included in the calculation of social security contributions. In general, only the salaries paid to human workers are subject to social security levies.

In his famous TV interview, Bill Gates seemed to go in the same direction when he said that: “If a robot comes in to do the same thing (as a human worker), you’d think that we’d tax the robot at a similar level.”14 This concept is viewed as a tax on income from enterprises using robots. Its justification relies on the compensation for the loss of salaries, but ultimately its purposes is to obtain additional resources for the state. In the author’s opinion, there is no negative judgement against AI or robotics carried by this concept. This is not a Pigouvian tax. As long as robots are not taxed as such, it makes sense to tax the use of AI by the enterprises or owners using them. Assuming that, in the long run, human labour, i.e. work for consideration as wages, reduces or even disappears, all income and social security levies attributable to the wages would be affected. The increase in profits resulting from the use of AI, in the author’s view, would not compensate for such a loss.

Englsich (2019) does not share this view, however. That author notes that should a robot levy effectively be imposed on the equivalent deemed human employment, in addition to the regular income tax on business profit paid by the latter, such a situation would result in an additional tax burden on income generating activities that rely on new technologies.15 This concern is valid, but it should also be considered that wages for human labour, as a source of income, would disappear under this scenario and would be replaced by a corresponding imputed income from the use of AI. Wages are the main source of revenues for social security systems around the world for developed countries. Furthermore, most states do not apply any social security levies on corporate profits. In addition, the rates of corporation taxes and income taxes at the individual level are quite different. In recent years, a global decline in corporate tax rates can be seen compared to individual income tax rates. There are also differences in the treatment of the amortization, and even the expensing, of investments in relation to AI and the payment of salaries to human workers on a monthly basis.16 In the author’s opinion, it is not possible to simply compensate for the loss of the income tax base attributable to human labour by arguing that productivity will increase, which should result in additional profit tax. Finally, and more importantly, the robot user tax should be regarded as a new system of taxation adapted to the new economy and targeting the use of AI as a whole. At the same time, it should require a coordinated analysis of both the robot user tax and an integration within the corporate tax system.

The proposal to introduce a robot tax on imputed income, at this stage, does not take into consideration any ability to pay of robots. It is true that, in general, wage taxes are designed to be borne by employees, whose ability to pay relates to the income that results from their employment.17 Under the author’s proposal, the use of robots corresponds

11. On 25 October 2017, Saudi Arabia granted citizenship to a robot called “Sophia”.


13. See Oberson, Taxing Robots? (2017), supra n. 1, at sec. 4. and supra n. 9, at p. 114 et seq.

14. Delaney, supra n. 2.

15. English, supra n. 10, at p. 268.

16. See Dimitropoulu, supra n. 12, at sec. 4.3.3.2., pp. 69 and 70, and Abbot & Bogenschneider, supra n. 1, at p. 64 et seq. For a different opinion, see English, supra n. 10, at p. 9.

17. See Lexer & Scarcella, supra n. 6, at p. 64. See also English, supra n. 10, at p. 269.
to an imputed income, which is attributable to the person or enterprise using AI. The ability to pay in this case refers to the entities or persons using the robots. The design of this robot tax on imputed salary should also consider the effective economic incidence of such a tax. However, the economic effect on taxpayers should be considered in a pragmatic manner, as the rules of incidence are very controversial and their effect is evolving over time. In fact, under this model, a robot tax should correspond more to profit taxes on corporations, which are partially borne by the employees, the shareholders and the consumers, with about half of the burden passed on to workers, according to various studies.

The criticisms regarding the difficulty in evaluating, monitoring and implementing a tax on imputed income are also not convincing. In Switzerland, an income tax has been applied on imputed rent for home owners for decades, and, even if it remains controversial from a political standpoint, the legislator and the administration were able to find a reasonable and fair system of tax based notably on statistical rents in delimited areas, which are then adjusted in accordance with specific factors, i.e. date of construction, works, location, etc. The same is true, in practice, in defining an arm's length salary for employees who are also qualifying shareholders of the corporations in which they work. There is a vast corpus of case law and applicable tests to define an appropriate salary, according to circumstances, and the author does not see why such analysis could not be transposed, mutatis mutandis, to allocate an appropriate theoretical “wage” for the use of robots. The definition of the use of robots subject to tax requires an adequate but pragmatic framework. Such a definition, following the principle of fairness and equality of treatment, should be form neutral and focus on the effect of AI on human labour.

3.2.2. Automation tax

The automation tax proposal is based on a somewhat different perspective. This tax is designed as a compensatory measure to alleviate the losses arising from labour disappearance. In other words, such taxes are justified by the principle of neutrality between human and robot workers. Under this approach, the tax would correspond either to a percentage of the taxable profit based on a ratio of human workers and/or total profits or a ratio based on the number of human workers and/or total turnover. Automation taxes could also either be general, thereby targeting all enterprises using AI, or special, focusing on specific areas of the economy, for example, transportation, storage or retail. The draft Geneva tax on “automated vending machine”, levied on some retail shops, is an example of a special automation tax.

According to English, taxing robots cannot be justified as a measure to restore a level playing field, i.e. neutrality between human and robots. Indeed, the tax treatment of the two factors of production, i.e. capital and labour, differs. Salaries are subject to wage taxes, usually at source, and payroll taxes, financing social security, while the use of robots is not subject to such equivalent levies. However, wage taxes are direct taxes on income of employees. They could be held as not constituting any cost for the employer, as they are borne by employees. Accordingly, English is of the opinion that the tax treatment of the cost of human force and of robots may be regarded as neutral under the current system, apart from cash flow aspects resulting from the lack of immediate expenses of acquisition of machinery. The same reasoning would also apply for payroll taxes, as they are conceived as employee contributions. In addition, if the real economic incidence of wage and payroll taxes is considered, it appears that, in the long term, most of the burden of the wage taxes is borne by employees, while the burden of a robot tax cannot possibly be shifted onto the robots themselves. Under this view, the robot tax would fall fully on the users of robots, reduce their profits and act as a disincentive for investments in modern automation.

Admittedly, the concept of neutrality between human and robot workers is difficult to implement. Robots are not humans. They do not need to eat and do not have children to raise. They are not affected by any pandemic diseases, apart from potential electronic viruses. This is why the “ability to pay” of robots is definitely not comparable with an ability to pay of humans. In section 3.3., the author further describes the specificities of the ability to pay of robots, which, like corporations, should refer to an objective capacity of payments, including a capacity to pay taxes. This peculiarity does, not in the author’s view, disqualify the concept of an automation tax. The author cannot really argue that the cost of human workers and robots is neutral under the current system. The income position of a human worker, who arguably bears the burden of the wage tax, should not be compared with the situation of a robot, which is used by a firm. What is rel-

18. The studies of the incidence of wage tax, as English notes, supra n. 10, at p. 269 et seq., range from a zero to a 100% effective tax on the employees, but tend to suggest in the long run that most of the burden is borne by employees.
20. Oberson, supra n. 9, at p. 15 et seq.
21. See Abbott & Bogenschneider, supra n. 1, at pp. 145 and 163. In the same vein, but focusing on software as a whole, see W. Messel, The Software Society: Cultural and Economic Impact p. 220 (Trattford Publ. 2013).
22. Abbot & Bogenschneider, supra n. 1, at p. 30, favour an automation robot-self-employment tax based on a ratio of corporate profits to gross employee compensation expenses, while Messel, supra n. 21 in proposing a tax on computers, would recommend an automation tax based on the ratio of a company’s revenues, i.e. total sales, to their number of employees.
23. For a description of this special automation tax proposal, see Oberson, supra n. 9, at p. 123 et seq. and Kovacev, supra n. 4, at p. 287 et seq.
24. English, supra n. 10, at p. 269.
25. Id.
26. See English, supra n. 10, at p. 270 and Dimitropoulou, supra n. 12, at sec. 4.3.3.2.. p. 69.
event is the position of the user of robots, which, on the one hand, may replace human workers, spare the salaries, paid on a regular basis and, on the other, can purchase and amortize investments in robotics, production factors with new and distinct features incorporating AI. These two situations are clearly not comparable. Under this perspective, the idea to try by way of an automation tax to bring back neutrality towards an enterprise supplying goods or services to consumers, either with the use of AI or with human workers, makes more sense.

In addition, the criticism noted in this section is based on a traditional division of production factors in the following two categories: (i) capital; and (ii) work. The author does not believe that, following the development of AI, this subdivision remains appropriate. After all, AI implemented into robotics takes the form of capital, i.e. property, incorporating algorithms, which eventually have the capacity to take autonomous decisions, learn and interact with others. Accordingly, investment in “smart” autonomous artificial intelligence (AAI) should be characterized as a different form of capital under a new and different perspective. In other words, robots and traditional capital also are different. In the absence of a capacity to pay taxes, robots are viewed as providing similar supplies of goods and services as human workers by using “artificial intelligence” that has the same effect, from the consumer perspective, as work done by humans. This situation is quite different from a comparison with traditional capital like real estate, a truck or a piece of equipment. To be a bit provocative, when the equipment becomes “smart”, from an equality of treatment perspective, the traditional rules of the taxation of capital should not apply any more. Robots will develop new skills, which eventually would depart from human tasks. However, by replacing human workers, the robot users are benefiting from production factors capable of creating additional profits and using data provided by users or consumers, which reflect an ability to pay that is also based on the “lost” subjective ability to pay of workers losing their salaries. In the author’s opinion, this position is what the automation tax concept tries to achieve, albeit in an approximate way.

The author recognizes that this system is not perfect. It can be regarded as a transitory compromise. The advantages of the proposal are that they do not require a complex definition of robots, as it focuses on ratio, thereby corresponding to the percentage of the number of human employees multiplied with either the total revenues or the profits of the enterprise. In contrast, a computation of the tax based on a ratio could trigger equality of treatment issues. In addition, as stated previously in this section, robots are not humans. The comparison should focus on the specificities of the smart technology, thereby belonging to a different category of production factors, beyond the traditional dichotomy of work and capital. This situation is also why the author prefers the option to view the robot user tax as a tax on imputed income resulting from the use of robots instead of humans. Finally, eventually, the comparison between robots and human activities will become more and more difficult to apply. At least, in the short run, equivalence or lump-sum approximation could be implemented in practice. In the long run, the idea to introduce a tax on robots as such, as some type of new legal entity, would become more appropriate.

### 3.2.3. Pigouvian taxes

Under this approach, a robot tax serves as a corrective tax, designed to compensate for the negative externalities linked to unemployment caused by automation. In line with this thinking, Shiller (2017) has advocated a transitory tax to help the economy and workers to adapt to the new economy. This model differs from the alternatives described in sections 3.2.1 and 3.2.2. Under this proposal, the robot tax is more like a “sin tax” designed to restrict the use of AI and robotics. Other commentators point out that such an automation tax would address the social costs in the case of mass unemployment as a consequence of robotics and tax the surplus derived from the use of personal data and disappearance of human work from robotics.

In the author’s view, in the short run, such a tax could be implemented to facilitate the transition toward the new economy. However, it is important to recognize that such taxes rely on a different policy perspective. As with so-called ecotaxes, i.e. CO2 taxes, pollution taxes, etc., a robot tax would correspond to a policy regulation designed to create a negative incentive against investments in robotics and to compensate for the social costs caused by automation, i.e. unemployment. The purpose requires a different constitutional justification and legal analysis. The implementation would be difficult. In particular, automation gives rise to positive externalities, notably by reducing or preventing damaging effects of routine tasks and fostering innovation. The legislator would have to find a proper balance between the negative and positive effects of such tax. This issue also exists for similar taxes used as policy instruments instead of with a fiscal perspective. The solution relies on the implementation of flexible rules, adopted after a broad consultation of interested actors, including possibilities to adapt, by regulations, the applicable rates or even abolish the tax, should the impact of it not be adapted any more with the economic situation, for example, by way of so-called sunset legislation. In addition, the definition of the robots subject to tax should focus on the consequences of a robot tax on the labour market and would require a specific framework. Under equality of treatment principles, all AI, independent of their forms, which have an effect of fostering the replacement of human workers with automation, should fall within the scope of the tax. In the author’s opinion, however, a Pigouvian tax is not an adequate solution in the long run. As the author sees it, the purpose of introducing a robot tax is not to limit...
or stop innovation. It should primarily be implemented as a new tax with a fiscal purpose designed to finance the loss of income from decay in human wages and the corresponding decline in consumption.

3.2.4. Alternatives: Tax on the global value added of the enterprise

There are other examples of taxes designed to address the use of new technologies, which tend to decrease the use of human workers. For instance, in Austria, a project for a Maschinensteuer (machine tax) was debated in 2016.32 This tax was designed to help finance the social security. In contrast to traditional social security levies, the tax would have been levied not on the wages paid to workers but on the value added of an enterprise. This value added would have been based not only on the sum of the wages but would have included also depreciation, profits, borrowed capital, rent and leases.33 In the same vein, in Italy, the so-called imposta regionale sulle attività produttive (regional tax on productive activities, IRAP), a tax levied by Italian regions to the finance health care system, also targets the value added of enterprises.34 The tax is levied on traders, subject to certain exceptions, such as banks, other financial institutions and insurance companies, on the difference between the value of production and production costs derived from a company’s financial books of accounts. In a case heard in 2002, the Court of Justice of the European Union (ECJ)35 held that the IRAP is not similar to European VAT and, therefore, was not contrary to article 33 of the Sixth Directive 77/388.36 The IRAP is not proportional to the prices of goods and services provided by the enterprise subject to tax and, therefore, is not intended to be passed on to the final consumer.37

A recent report of the Swiss government also refers to such an approach.38 The report noted that, in the context of robotization, an alternative method of financing social security would consist of broadening the tax base of social security from employers to the global value added created by all enterprise. This tax, referred to as the taxe sur la valeur ajoutée brute (gross value added of the enterprise), would subject to tax the global salaries paid, amortization charges on capital and the net profits of the enterprise. Accordingly, all production factors, i.e. capital and labour, would participate in the financing of social security, so that the system would be neutral and, at the same time, alleviate the costs of labour.39 The introduction of such taxes could be another approach to the developments of technology, including AI and robotics, and its effect on human labour. As such, they are not robot taxes, as they do not specifically target robots or their use; rather, they broaden the base of the social security levies on the whole value added to include the profits arising from the use of technology. The problem with these taxes is that they would have different effects according to the business sectors. The Swiss report also takes a critical position with regard to this approach by noting that such a reform would tax de facto more heavily the capital and its income, thereby reducing the incentive in favour of most productive capital investments. This system would also benefit labour-intensive enterprises and disadvantage capital-intensive sectors.40 In addition, these taxes are difficult to administer, as they require the computation on the global value added of the enterprise. In the author’s view, VAT, as a global tax on consumption targeting the supply of goods and services, is a more promising approach to deal with the development of AI. VAT is neutral. Human labour income does not fall within the scope of VAT. However, in order to address properly the development of robotics, it is necessary to consider ultimately including robots, to the extent that the legislator may define them, as taxable persons (see section 3.3.).

3.3. Taxes on robots as such

3.3.1. Robots as persons subject to tax

In the long run, the idea of taxing robots as such, even if it is very controversial, in the author’s opinion, could appear to be the more promising one. This proposal would be especially the case in the area of taxing consumption, i.e. by way of VAT or GST. Admittedly robots, to the extent that they are defined in an appropriate way for tax purposes, do not, at this stage, benefit from an ability to pay. What many critics to this approach do not seem to admit is that this is not about a subjective ability to pay, which, under constitutional law, considers the personal financial capacity of human individuals. The author’s approach is more comparable to the profit tax, which is a tax based on a different principle than the income tax. The ability to pay of corporations, even if it remains a controversial topic of discussion among scholars, refers to an objective ability to pay,41 viewed as a capacity for payment. The profit tax on corporations is based on the “separation theory”.42 The tax could be analysed, in an integrated system, either as a prepayment of the income tax of the shareholders, at the corporation stage, or as a compensation for the benefits linked with the legal personality attached to the corporation. In any event, a corporation, unlike a human, does not exit per se, but is a

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34. Lexer & Scarcella, supra n. 6, at p. 66.
35. Id.
36. Id., at p. 67.
39. Banca Popolare di Cremona (C-475/03), at para. 30 et seq.
41. Id., at p. 23.
42. In the same vein, see Lideikyte Huber, supra n. 19, at p. 286.

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creation from the legislator. The author does not see why such an approach could not be followed by the legislator for introducing a taxation of robots. Such action would require: (i) a proper definition of robots; and (ii) the attribution of a tax capacity to them.

First, a definition of robots is required. This is not an easy task and has been noted repeatedly by the opponents of any kind of robot taxes as one of the main obstacles to such a tax. In the author’s view, a practical definition is feasible. The design of the scope of robots subject to tax should be adequate for the purpose of the tax. To that end, a practical criterion that permits an appropriate distinction between robots subject to tax and other types of machinery or capital goods should be introduced. In the author’s opinion, the focus should be on “smart robots”, including AI embodied in robotics and algorithms. In the tax area, a “form neutral” definition is required and not a restricted “anthropomorphist” vision of the robots. Otherwise, tax planners could easily circumvent the tax by using computer software running with AI instead of “physical” robots. Consequently, the legislator could provide for an appropriate definition, which should be flexible enough to encompass the evolution of the technology. In the past, when the legislator was confronted with the task of defining the scope of the profit tax for corporations and other complex forms of entities, i.e. partnerships, investments funds, foundations, trusts, etc., it also had to find a proper balance between practicality and efficiency and opt for a suitable and fair definition of the persons subject to tax. In the context of this article, what is relevant is the existence of an AAI.

Second, the legislator should adopt a new form of entity subject to tax. More than a century ago, corporations, as legal entities, were not necessarily recognized, and it took decades to define the scope of that concept and its legal limitations. The legislator, for example, ruled that corporations should have specific rules of governances, i.e. statutes, board of directors, general assembly, accounting obligations, etc., and a capital account, i.e. equity, which could also ensure a capacity for payment. In addition, often, corporations had to register in an official register or registre du commerce.

In the case of robots, adequate legislative requirements could be introduced that were adapted to the AI and robotics industry. What is relevant for the purpose of this article is again not a subjective ability to pay, in contrast to humans, but a functional ability to pay in the form of a capacity for payment. Corporation taxes are justified by the separate entity approach. In addition, in order for an entity to be subject to tax, it is not even necessary to be recognized as a legal person, as it is already the case in current tax law. However, it is crucial to have a capacity for payment, in the form of a separate patrimony, or at least specific assets legally attributed to the robots as such. The robots should be in a position to hold the funds, and the access to these assets is restricted in some form for use by others, notably humans owning, directly or indirectly, the entities controlling the robots. In this respect, it is interesting to note that the critics of the robot tax are evolving and commentators do admit that the technical evolution could permit a tax on robots as such in the future. Kovacev (2020), based on the practical difficulties of implementing and administering a robot tax, still does not favour a widespread adoption of such a tax to solve the dilemma of the vulnerability of the tax system, which still relies heavily on human effort to raise revenues. He, however, admits that the situation could evolve, to the extent that technological advancement could permit a more direct solution in which AI or robots could enter directly into contracts and manage bank accounts on their own behalf. English also recognizes that a different assessment would be possible, but “only as the accessibility of robot-generated funds by the respective owner or user were to be significantly limited in the future”.

The current technological developments in AI, combined with the use of blockchain, will certainly offer various possibilities in this respect. Accordingly, the legislator could introduce rules for the registration of robots, the attribution of a minimum capacity for payment and some supervision requirements.

Furthermore, the need to introduce a tax capacity to robots could eventually become a necessity to safeguard the efficiency and integrity of the tax system as a whole. First, robots, through various strategies, could be used for tax avoidance purposes. So far, most commentators have not recognized the need for a robot tax, as robots are property, being as capital goods, which are owned or,
at least, controlled by humans. This assertion may eventually not be true. Even under current law, Bayern (2015) has argued that it would be conceivable that an autonomous algorithm could receive legal personhood by getting control of a limited liability company (LLC). Under this approach, the algorithm could exercise the rights of the LLC. This possibility and the mechanisms by which AI could gain control over such entities are further explored by Lopuci (2018). As a result, a robot, through the use of the entity, could own wealth and could enter into commercial transactions. Such a development would entail a major risk of tax evasion. Indeed, the algorithm, controlling the LLC, would be in a position to avoid paying tax. Not only the LLC could be situated in a favourable jurisdiction, but its controlling person might not be liable to tax at all. From a tax standpoint, such a development, in the author’s view, favours even more the introduction of a tax capacity to smart robots, including algorithms. Should a legal entity be controlled by a robot, the interaction with humans would be facilitated. Not only the robots could “inflict damage”, but they could try to avoid paying tax. Furthermore, they could retain any distributions of funds and use them for investments or other purposes, with a theoretical unlimited possibility of deferral. Under this model, the entity controlled by the robot would still be the legal taxpayer, but the absence of humans as controlling persons could undermine the possibility to enforce the tax law.

Second, and going further, following the technical developments, it is even conceivable that robots or AI could be controlled by another algorithm without any controlled entity. In this case, the robots could be theoretically in a position to retain funds and not distribute them to any taxable taxpayers, thereby avoiding any potential tax. Then, such an effect would contradict some of the critics of robot taxes who argue that taxying robots corresponds in the end to a tax on production factors of enterprises owned by humans, notably shareholders. As a consequence, granting a tax personality to robots could be regarded as a way to secure the existence of an otherwise potentially disappearing taxpayer. Under this scenario, the robot as such becomes the ultimate taxpayer. In order to prevent any kind of possible tax avoidance mechanisms from arising, it could be possible to do in fact the opposite, in having an algorithm controlling an entity. The robots, as a taxpayer, should be supervised, directly or indirectly, by humans, who could verify the tax compliance and ensure that robots do not go beyond their programmed activities. As with corporations, the registration of robots should be implemented, as well as the obligation to disclose the beneficial owners of the robots.

In this case, the issue of the real economic incidence of the tax on robots should take into consideration the fact that the taxpayer, i.e. the robot, becomes a legal entity, which, as with a corporation, has the ability to retain separately the attributable funds, mostly for reinvestment purposes. The economic incidence of the future profit tax on robots as such could, at least in the short run, have a comparable effect to the incidence of the profit tax but, in the long run, with the development of AAI, would be governed by different rules. Studies of the incidence of corporate profit taxes are controversial, but most admit that a significant part of the profit tax is borne by labour and by consumers, depending on price elasticity. Does this mean that humans remaining at work in a world of automation would bear a significant part of the incidence of the tax, corresponding to a reduced net wage received? A comparable effect is possible, but, eventually, different rules would apply. By definition, a tax on robots as such applies to AAI, which would be able to act in an independent way according to the algorithms programmed. In other words, human interventions towards the “use” of profits received would remain remote, limited to the supervision or control of the proper use of those funds. Accordingly, the situation would be different from a corporation owned by shareholders and governed by a board of directors. In addition, as discussed in section 2, a tax on robots as such would apply in a world where human labour would drastically shrink, notably routine work. Recent studies tend to show that, at least in the short and medium term, mostly routine workers would be replaced by automation. This situation would imply a different appraisal from the incidence of robot tax than from “traditional” corporations. Economic studies demonstrate that it is low-skilled workers that bear the most of the incidence of profit tax on corporations. It is interesting to note that there could be a type of correlation between the disappearance of routine workers, usually but not always also low skilled, who are affected by automations, and the reduced wages of the same workers, caused by an increase in the profit tax on corporations. Consequently, in a world governed by automation, the tax would probably be mostly borne by the ultimate taxpayers, owning automation, and consumers. This conclusion is consistent with studies that show that the effect on wages of profit taxes on large multinational corporations operating in multiple jurisdictions is close to zero. AAI would be used mostly by entities or robots operating worldwide. Should the robots be controlled by an algorithm, the analysis of the economic incidence becomes more puzzling. In this


56. Id., at p. 7.

57. See, by analogy, the examples used by Lopuci, supra n. 55, at p. 7 et seq., notably on the potential use of algorithm entities for criminal purposes.

58. In this sense, see De Lima Carvalho, supra n. 47, at p. 431, uses the word “containment”, instead of human control, to refer to the barriers controlled by humans to prevent AI from going beyond the limits assigned.

59. See notably Fuest, supra n. 19, p. 14 and Fuest, Peichl & Siegloch, supra n. 19, at p. 415 et seq.

60. The author wishes to thank Johann Hattingh for raising this issue.

61. See Guerreiro, Rebelo & Teles, supra n. 7 and Thuemmler, supra n. 7.


63. Id.
theoretical case, robots would not have humans in control, i.e. neither director nor shareholders, and could become the ultimate taxpayer. The introduction of taxes on robots as such would then be even more justified under a constitutional ability-to-pay perspective.

Third, the introduction of robots as new tax persons could help to address issues of international allocation of profits arising from AI. In the same vein, De Lima Carvalho (2019) argued that AAI, notably characterized by the absence of human control, but with containment, and the full management power over its own actions and resources, could allow for a new concept definition of AI as a taxable person to address the specific issues relating to the OECD/G20 Base Erosion and Profit Shifting (BEPS) initiative that are occasioned by AI. Indeed, in De Lima Carvalho’s opinion, some profits arising through the use of AI could be taxed nowhere due to the absence of a taxable person, on the one hand, and of a sufficient nexus of AAI, notably residence, on the other. Addressing the issues of international allocations of profits arising from AI would go beyond the scope of this article. However, it appears to be clear that legal or at least tax personality for robots could facilitate the allocation of profits attributable to it under international tax rules. This situation would still require many adjustments, such as a revisiting of the rules of attributions of profits between head office and permanent establishment (PE) and of transfer pricing rules.

3.3.2. An income tax capacity for robots

Robots, as defined by the legislator for profit tax purposes, could be subject to some kind of profit tax. The objective ability to pay would correspond to the possibility to obtain such income by entering into a transaction and the right to decide, autonomously, how to use the funds. As with a corporation, the robots could have the legal possibility to retain the funds, under specific limitations and, therefore, give rise to a deferral of revenue to its owners, i.e. the shareholders, which is usually regarded as justifying corporation profit tax.

If a robot is subject to profit tax, any potential double economic taxation should be avoided. This matter is a technical issue, which as such does not disqualify the taxation of robots. In many countries, under the so-called classical system, double economic taxation of corporate profits and dividends has existed for decades and has been progressively reduced without leading to the abolition of the profit tax as such. In addition, the author recalls that the taxation of robots is based on a new perspective of the tax system and should lead to its re-examination but in coordination with existing rules and principles. However, the traditional issue of double economic taxation could need a different analysis. Should the robots ultimately be owned by humans, this concept could still make sense, but the solution would be different if the robots are held by a corporation or even by an algorithm. The analysis of the effect of double economic taxation would then necessitate a different view.

3.3.3. Robots as taxable persons for VAT purposes

Currently, many robot activities are in fact already subject to VAT and/or GST. When a car is sold to the consumer, the costs linked to the use of industrial robots are included in the global value added charged. A lawyer using AI to help legal research includes these costs in the final legal bill borne by the client.

More interestingly, robots could become a taxable person as such, subject to VAT. This possibility appears promising, as VAT is an indirect tax on consumption. The relevant ability to pay, from a constitutional principle, is the capacity for consumption of the consumer. The taxable person is a mere tax collector for the government and is not supposed, in essence, to bear the burden of the tax. Accordingly, what is relevant is more the capacity for payment and the faculty of a robot to enter, on its own, into a contractual relationship and its ability to have sufficient autonomy to supply goods or services. In addition, under VAT regimes, not only legal entities may be taxable persons but also any enterprises, i.e. partnerships or single entities, with sufficient legal autonomy.

It follows that, with the evolution of technology, should funds be specifically attributed to robots, the legislator could consider including them as taxable persons. In this context, Englisch admits that such a development could first materialize, for example, with decentralized autonomous organizations (DAOs), based on blockchain technology, using smart contracts and cryptocurrencies. As a consequence, it is conceivable that robots as such, in a legal (electronic) form yet to be defined by the legislator, could become taxable persons for VAT purposes. The author could even imagine that robots could be programmed not only to charge the output VAT on their taxable supplies but also to credit the input VAT on supplies received.

3.3.4. Robots as objects

A more traditional form of robot taxes is levied on robots considered as objects. This perspective is based on an old vision of robots in which they are treated like objects, i.e. as machines, in a similar way to cars, planes, boats, dogs or real estate. Such a position is the easiest and least promising way to tax robots. It comes as no surprise that the first models of existing robot taxes are taxes on self-driving cars or drones, which are object taxes. Ultimately, with the growing expertise on the use of AI, more “modern” types of robot taxes could be introduced.

64. De Lima Carvalho, supra n. 47, p. 425 et seq.
65. Oberson, supra n. 9, at p. 143 et seq.
66. For more details, see X. Oberson, Intelligence artificielle et TVA (Artificial Intelligence and VAT), in Au carrefour des contributions: Mélanges en l’honneur du juge Pascal Mollard p. 147 et seq. (Oref ed., Stämpfli Editions, Bern 2020)
68. Id.
69. Oberson, supra n. 9, at p. 168.
70. Kovacev, supra n. 4, at p. 208 et seq.
4. Definition of Robots Subject to Tax

One of the most frequent criticisms of robot taxes is the difficulty in defining a robot for tax purposes. Admittedly, this is a fundamental issue and a requirement based on the principle of legality and equality of treatment to have a practical definition of the taxpayer. Yet, there is a difference in the analysis if the discussion is about taxing the use of robots, on the one hand, instead of robots as such, on the other. In the first case, the taxpayers should be the entities using robots, in the absence of an ability to pay, and robots are just elements of the tax base. The robots become taxpayers, thereby disregarding the important issue of the incidence of the tax, only in the second case. In the author’s opinion, the definition is still possible, and its essential elements should be fixed by the legislator. What is relevant is the purpose of the tax.

In the case of robot user taxes, to the extent that the purpose is to raise funds to address the disappearance of labour, a broad definition should apply. The characterization relies on the autonomy of the robot. The definition should be “form neutral” also and focus on the effect of AAI on the human labour market. The question is not whether a dishwasher or a vacuum cleaner should be subject to tax but whether the enterprise using robots replaces work that could have been effectuated by humans. In contrast, in the case of a Pigouvian tax, which is intended to internalize externalities caused by automation, the tax should be more focused on targeting physical infrastructures, thereby requiring local presence. In addition, it would be advisable to consider, in an evolutive manner, the effective impact of the automation tax on workers. The views are controversial indeed, but many studies tend to confirm that it is not necessarily low-skilled workers but routine tasks that are at risk of replacement by automation.

Accordingly, in order to implement a robot tax with an interventionist purpose (“Lenkungssteuer”), the legislator should try to identify better what types of jobs are more affected by automation, being typically routine manual workers. This is not an easy task, but the law could be flexible enough, for example, effected by way of regulations to adjust to the evolution of the disruption in the labour market. This situation is not new. It also exists in the case of other types of Pigouvian levies, such as ecotaxes, whose taxable base and rates must be adjusted frequently to take into account the evolution of technology and its effect on the environment.

The tax on robots as such represents a most delicate challenge. In order to introduce a fair and yet practical definition of entities within the scope of the tax, the legislator should find a relevant definition that is both flexible, adapted to the evolution of technology and still complies with the rule of law. This issue would represent a fun-

71. In this sense, see T. Falcão, Should My Dishwasher Pay a Robot Tax?, 90 Tax Notes Intl. 12, p. 4 (29 June 2018).
72. Englisch, supra n. 10, at p. 275.
73. G. Bottone, A Tax on Robotic? Some food for thought, Dipartimento Delle Finanze (Department of Finance), Working Paper, p. 12 (Sept. 2018). See also Guerreiro, Rebelo & Teles, supra n. 7 and Thuemmel, supra n. 7, at p. 37 et seq.
74. See Englisch, supra n. 10, p. 264 et seq. and Mazur, supra n. 10, at p. 20.
75. See Kovacev, supra n. 4, at p. 201 et seq.; Mazur, supra n. 10, at p. 301 et seq.; Englisch, supra n. 10, at p. 271; and Oberson, supra n. 9, at p. 155 et seq.
76. Englisch, supra n. 10, at p. 272.
77. Dimitropoulou, supra n. 12, at p. 73 et seq.
The debate on robot taxes has raised much attention worldwide. From the beginning, the author has been advocating taxing the use of robots or robots as such. What could have been regarded as science fiction, lacking a serious basis, is now being carefully analysed, criticized and balanced in comparison with other policy instruments to deal with the effect of automation and robotization. Many of the critics focus on the implementation and practical aspects of the proposal. What these critics fail to recognize is the importance of this major disruption and industrial revolution on the tax system. When smart robots replace human workers, become capable of interacting autonomously in the market and raise significant profits or revenues worldwide, it would appear to be necessary, from a tax policy standpoint, to address this development in a fair and efficient way. The author is not talking about dishwashers or vacuum cleaners replacing humans, but of AAI capable of entering into contracts, learning from experience and deciding autonomously, sometimes worldwide.

The same is true of critics arguing about the impossibility of comparing robots to humans, the so-called human fallacy, or even to corporations, in noting the differences between AI and/or robots and these persons. Admittedly, there are many differences, but this is not the point. The legislator, faced with new issues, such as the appearance of new types of entities with AAI, will have to address this development. The author’s view is not to apply mutatis mutandis individual income or corporate profit tax rules to robots, but to design the most relevant tax applicable to this new form of entity, based on existing constitutional, economic and tax principles. When the legislator had to define rules for corporate profit tax, it was also faced with many technical difficulties, such as defining the tax base, the place of residence of the corporation and systems of avoidance of double economic taxation, not to mention transfer pricing rules within closely related entities. These policy and implementation difficulties are not as such a valid argument to dismiss out of hand the introduction of robot taxes.

This contribution has tried to argue that there are still many arguments in favour of a robot tax and that these implementation issues could be solved by policymakers. In a first stage, a tax on the use of robots, notably in the form of an imputed salary, remains in the author’s view the best option. Automation taxes, based on the ratio of human workers in comparison to the total revenues or profits of an enterprise, appear to be a possible but imperfect solution of compromise. Should the legislator favour a Pigouvian tax, i.e. a tax designed to internalize the negative externalities (unemployment) caused by automation, it should consider the specific goal of such a tax, which requires flexibility and a definition of the scope of the tax.

78. Chand, Kostic & Reis, supra n. 10, at sec. 4.3., p. 17 et seq.
Finally, in this situation, robots would become the ultimate taxpayers. However, under current law, they are “shadow” taxpayers, floating somewhere in the cloud.

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