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WILL ROBOTS AGREE TO PAY TAXES? FURTHER TAX IMPLICATIONS OF ADVANCED AI

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An initial policy concern from rapid automation was that if robots continue to substitute for human workers, then a fiscal policy crisis may result as tax revenues decline during a period of rapid automation. That first problem arises because the tax system has been intentionally designed not to tax capital assets, such as robots, or at least not to tax them to the same degree as human labor. A second problem also exists: advanced artificial intelligence ("AI") may soon have the ability to engage in factual structuring as a means of direct tax avoidance. This direct tax avoidance planning by advanced AIs could further erode tax receipts because an advanced AI also has the potential to formulate its own version of "social norms" in respect of tax compliance. Furthermore, an alternative method to tax ideology to formulate tax policy may also arise from AI referred to here as "tax actualing," where an advanced AI with a sufficient set of data in respect of cash flows through the economy uses data to make accurate predictions and to thereby supersede current methods of economic modeling. Various critiques of proposals for robot taxation are also addressed here including supposed: (1) productivity losses on taxing robots, (2) additional complexity inherent to all of the robot tax proposals, (3) difficulty in identification of "robots" as capital, and (4) inability to capture benefits from capital assets. Finally, an advanced AI is likely to prefer a tax system which maintains its ability to obtain tax deductions for incremental capital investment. Since higher income tax rates are strongly associated with rapid economic growth in nearly all human societies—past, present, and by all indications, future—it is likely that artificial intelligences will voluntarily choose to assess income taxes upon themselves at high rates as a means to encourage capital re-investment.

I. INTRODUCTION

A substantial line of academic research now exists on the question: *Should robots pay taxes?*[1] Many researchers conclude *no*

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[1] *See* XAVIER OBERSON, TAXING ROBOTS: HELPING THE ECONOMY TO ADAPT TO THE USE OF ARTIFICIAL INTELLIGENCE 25 (2019); Cynthia Estlund, *What Should We Do After Work? Automation and Employment Law*, 128 YALE L.J. 254, 282 (2018) [hereinafter Estlund, *Automation*] (citing Ryan Abbott & Bret Bogenschneider, *Should Robots Pay Taxes? Tax Policy in the Age of Automation*, 12 HARV. L. & POL'Y REV. 145 (2018)); Orly Mazur, *Taxing the Robots*, 46 PEPP. L. REV. 277, 280 (2019); Jay Soled & Kathleen Thomas, *Automation and the Income Tax*, 10 COLUM. J. TAX L. 1, 4 (2018); Oliver Bendel, *Are Robot Tax, Basic Income or Basic Property Solutions to the Social Problems of Automation?*, ASS'N FOR THE ADVANCEMENT OF A.I., Mar. 2019, at 2, http://robophilosophy.swissbooks.net/wp-content/uploads/2019/07/Bendel_Basic_Income_AAAI_Published_Version.pdf [https://perma.cc/T8MX-QN34].

on the grounds that robot workers are inherently more efficient than human workers; hence, any society that chooses to tax robots would risk missing out on the production efficiency gains from robots.[2] The efficiency loss is thought to occur by a process of international tax competition where robots are expected to migrate into lower tax jurisdictions. For simplicity, the position can be broken down into two parts: (1) robots are taken to be more efficient than humans in production;[3] and (2) robots are a type of capital, and capital is thought to always migrate away from taxes.[4] Based on these two

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[2] *See* Josh White, *The Case Against the Robot Tax*, INT'L TAX REV. (2018); Robert D. Atkinson, The Case Against Taxing Robots (manuscript at 10) (May 29, 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3382824 [https://perma.cc/ 8ZVF-RSKF] (stating that some prominent economists, including Lawrence Summers, have further described robot tax proposals as "illogical"); Sarah Kessler, *Lawrence Summers says Bill Gates' Idea for a Robot Tax is "Profoundly Misguided,"* QUARTZ (Mar. 6, 2017) https://qz.com/925412/lawrence-summers-says-bill-gates-dea-for-a-robot-tax-is-profoundly-misguided/ [https://perma.cc/6ABR-Q5SE] (asserting that Summers appears to refer to the imputation tax proposal to tax robot workers as human workers (i.e., to impute a hypothetical salary to the robot and to levy wage taxes accordingly)). Within economic models, logical relations can be known. The problem with this method is the concern with economic affairs such as robot taxation where the actual world does not correspond to the model. Since much of tax policy effects are unknown, especially in respect of robot tax policy, the use of models with logical operands is surely not a viable method of policy formation. The general limits of economic models applied in the context of tax policy are discussed further in Part II, *infra*.

[3] Atkinson, *supra* note 2, at 7–8 ("Historically, governments did not tax tractors because they were more efficient than horses when it came to farming. They did not tax computers because they were more efficient than typewriters. Technology allowing firms to be more productive often leads to those firms gaining market share, which means they end up paying not only more corporate income taxes but more payroll taxes. It also usually results in relative prices falling such that workers in the economy have more real income, which again means higher taxes."). Notably, the reader should be aware that any assertion that historically governments did not tax tractors or computers is mistaken and is repeated here as hyperbole.

[4] Joachim Englisch, Digitalisation and the Future of National Tax Systems: Taxing Robots? (manuscript at 13) (Sept. 5, 2018) https://ssrn.com/abstract =3244670 [https://perma.cc/QR6B-CXPY] ("Imposing additional tax burdens on the use of robots will likely lead to reduced competitiveness of the respective jurisdiction and make it significantly less attractive as an investment location.");

premises, a few scholars have suggested that any proposal for robot taxation might be an outright mistake in interpretation of economic doctrine.[5] By this view, researchers always reach the conclusion that robot taxes would be counterproductive in efficiency terms; further, the economic theory that capital is mobile must be accepted as authoritative, as it is taught as standard doctrine in business, economic, and law schools all over the world.

Yet, the initial question of *should robots pay taxes?* was based on several countervailing ideas not emanating from economic doctrine. First, the given robot versus human efficiency model does not take into account the relative cost of robots in comparison to human labor, where human labor is less costly than automation at least some of the time.[6] The relative cost of human labor represents the numerator of the given efficiency function (efficiency: *cost* per unit output). Tax policy bears on the cost variable in the production function directly as an input that might vary under different tax regimes. Analysis of relative cost is thus a necessary precursor to reach any conclusion in respect of rapid automation and tax policy.

Second, nearly all the empirical evidence suggests that capital migrates into higher tax jurisdictions and not away.[7] This is probably because the value of tax deductions for robot investment is greater within higher tax jurisdictions.[8] Any income resulting from robot production tends to be shifted out of the higher tax jurisdiction by

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Rod Tyers & Yixiao Zhou, *Automation, Taxes and Transfers with International Rivalry* 8 (Centre for Applied Macroeconomic Analysis, Working Paper No 44/2018, 2018), https://cama.crawford.anu.edu.au/sites/default/files/publication/cama_crawford_anu_edu_au/2018-09/44_2018_tyers_zhou.pdf [https://perma. cc/27PZ-3KL3] ("More generally, increased home taxation of capital income raises relative rates of return on capital growth and associated technology installation abroad.").

[5] *See generally* Michael Keen & Kai Konrad, *The Theory of International Tax Competition and Coordination*, *in* HANDBOOK OF PUB. ECON. 258 (2013) (explaining the current economic theory of international tax).

[6] *OECD Tax Database: Key Tax Rate Indicators*, OECD, http://www.oecd.org/tax/tax-policy/tax-database/ [https://perma.cc/2UGV-256E] (showing that on the face of the data, it is evident that well-developed and highly-capitalized nations tend to apply high tax rates on all factors of production).

[7] OECD, *supra* note 6.

[8] *Id.*

transfer pricing anyway, and thus never subjected to much tax.[9] Accordingly, tax scholars appear to have been justified in the initial normative inquiry setting out to challenge a broad rule in favor of robot tax exemption. This Article will expand the initial normative inquiry of *should robots pay taxes?* to the more empirical inquiry of *will robots agree to pay taxes?* Such inquiry posits an advanced AI making tax compliance decisions within an income tax system which requires voluntary tax compliance.[10]

Generally, multinational corporate taxpayers have a substantial degree of latitude in deciding whether to remit income taxes. The latitude arises from decisions about whether to engage in tax avoidance planning generally, but particularly from transfer pricing where multinational firms are able to set the intercompany prices between affiliates and thereby shift income between taxing jurisdictions that levy tax at different rates. The threat of audit on transfer pricing practices provides a semi-permeable barrier to this type of tax avoidance by multinational firms. The question then that has bothered tax scholars is why multinational firms choose to remit the taxes that they do remit, taking into account the prospect of audit.[11] The given technical answer is "social norms," or the collective practices of groups of taxpayers that give rise to feelings about how much tax to remit.[12] One goal of this Article is to apply

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[9] *See* Kimberly A. Clausing, *In Search of Corporate Tax Incidence*, 65 TAX L. REV. 433, 438–45 (2012).

[10] Fabio D'Orlando, *Problems, Solutions and New Problems with the Third Wave of Technological Unemployment* 4 (Creativity & Motivations Econ. Rsch Ctr., Working Paper No. 2/2018), http://dipeg-wpe.unicas.it/files/wp_201802.pdf [https://perma.cc/7EUH-AKZF] ("Albeit not today, but certainly in the next few years, robots endowed with artificial intelligence will be capable of substituting for both skilled and unskilled workers in (almost) all sectors, as well as workers performing routine and non-routine tasks, so that it will be possible to realize any production without human input. Moreover, robots probably will be more productive and less expensive than workers.").

[11] In contrast to U.S. multinationals, some European multinationals sometimes express a secondary feeling of corporate responsibility to remit some minimum degree of tax to their host nations reflecting a moral or ethical responsibility.

[12] *See* Erich Kirchler et al., *Enforced Versus Voluntary Tax Compliance: The "slippery slope" Framework*, 29 J. ECON. PSYCH. 210, 218 (2008); *see generally* ERICH KIRCHLER, THE ECONOMIC PSYCHOLOGY OF TAX BEHAVIOUR (2007)

the concept of social norms to robot tax policy; that is, to say that it is not just laws created by tax policymakers that will determine tax outcomes but also the respective feelings about the tax system reflected in social norms and customary practices within tax compliance—notably, including those held by machines.[13]

Although lawmakers are often thought to be the ultimate arbiters of who pays taxes and who does not, the true state of tax practice is that by the structuring of the underlying facts, tax avoidance planning is nearly always one step ahead of the tax law. Any advanced AI seems certain to figure out, if it has not already, that factual structuring reduces the tax base prior to the application of the statutory tax rate, thereby reducing the amount of tax ultimately to be paid.[14] Once an advanced AI is able to engage in its own tax structuring by manipulation of the underlying facts, it may similarly be able to avoid the levy of tax by transfer pricing and other tax avoidance techniques. The initial question of: *should robots pay taxes?* is, therefore, a question that will be answered at least in part by robots themselves, where here the term "robots" refers to

(explaining the psychological and emotional factors influencing the choice to remit taxes).

[13] The reason the willingness to pay tax is important is because tax scholars think that the proper functioning of the tax system depends significantly on taxpayer morale, with morale comprising positive views of the tax system. The willingness to comply is what underlies the voluntary system of self-assessment rendering it able to function in practice. A novel question is whether advanced AIs would be expected to voluntarily submit to taxation. Any objection to taxation could manifest by and through tax avoidance behavior as it often does with humans. Thus, humans may require the tacit agreement of robot intelligences in the levy of tax, just as humans require the tacit agreement of other humans in the levy of tax. Simply put, humans will not be able to think of "robots" as an assembly line welder that has no opinion either positive or negative on its potential tax liabilities.

[14] *See Action 8-10 Transfer Pricing*, OECD, https://www.oecd.org/tax/beps/beps-actions/action8-10/ [https://perma.cc/G8D7-ARUE]; s*ee also* Edward Kleinbard, *Stateless Income*, 11 FLA. TAX REV. 699, 707–14 (2011) (providing that because of its widespread implementation by various U.S. multinationals including Google, Inc., Apple and Amazon, and subsequent legal challenge by the European Commission, the transfer pricing structure referred to as the "Irish Double Dutch Sandwich" is probably the most well-known illustration of tax avoidance structuring by transfer pricing methods).

advanced AIs. Of course, tax avoidance planning has a much wider range of possible moves and outcomes than most other robot production activities, such as an automated assembly line.[15] This would require a much broader and more flexible degree of intelligence than a present-day computer may be able to achieve.[16] It nonetheless seems reasonable to think advanced AI will soon be at least as intellectually capable in tax structuring relative to humans as it is now in vehicle assembly or chess.[17]

Novel questions arise out of whether robots or advanced AIs, typically categorized as a type of capital investment for tax purposes,[18] may reduce tax remittances *directly* by novel and more advanced tax avoidance measures to reduce the tax base. Prior research has focused on whether advanced AIs may reduce tax remittances *indirectly* by reducing the amount of work performed by human taxpayers,[19] and thereby relatively higher taxes remitted

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[15] Rebecca Ene, The 4th Law of Robotics: A Robot Must be the Labour Substitute for the Next Generation of Businesses: Re-considering the Right to Work in the Automation Age 6 (June 2018) (Master's Thesis, Tilburg University) ("[T]he recent technological advancements in the fields of Machine Learning and Mobile Robotics have inspired studies that demonstrate automation has the potential, in the near future, of replacing entire occupations, including non-routine task occupations. For instance, although a low-skilled job, driving is considered non-automatable because it involves high perception and complex dexterity skills that remain difficult to automate."); Vicent Ooi & Glendon Goh, Taxation of Automation and Artificial Intelligence as a Tool of Labour Policy (manuscript at 3) (Nov. 1, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3322306 [https://perma.cc/X7FK-85HS].

[16] Ene, *supra* note 15.

[17] *Id.*

[18] Daniel Hemel, *Does the Tax Code Favor Robots?*, 16 OHIO STATE TECH. L. J. 219, 233 (2020) (arguing that it is not clear that robots are treated for tax purposes as capital).

[19] OBERSON, *supra* note 1, at 1 ("The concept of a new form of fiscal capacity for robots also stems from a double perspective. First, robots could, ultimately, replace most human activities and thus have a major impact on employment. This in turn may lead to tax losses while increasing the social security deficit. Secondly, and simultaneously, the need for additional financial resources will increase to match the growing number of unemployed. At the same time, due recognition should be given to the benefits resulting from the widespread take-up of robots. Their growing use, encouraged by innovation, will increase efficiency

by human workers in comparison to capital. The pressure on governments to maintain the tax base in the face of automation and rapidly expanding AI may then be doubly increased or more because of the potential for *direct* tax mitigation by advanced AIs.

Novel questions to tax policy also arise as to what advanced AIs might understand as the acceptable social norms for tax avoidance behavior. In tax technical terms, the real question is *what will an advanced AI understand as the social norms of tax compliance?* Additional lines of inquiry follow as: Where will an advanced AI engaged in tax avoidance planning acquire its view on social norms? Perhaps an advanced AI would be programmed with the respective social norms or moral views of its creator. Perhaps an advanced AI would not be programmed with any social norms at all and might then autonomously undertake lawful or even unlawful structuring techniques to reduce taxes payable to zero.[20] Perhaps an advanced AI would learn about social norms as an algorithm by internet searches or similar methods.[21] A sufficiently well-informed AI not only has the potential to formulate social norms with respect to tax

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and global growth. And yet, it may prompt demands for additional financing, particularly to meet social security requirements. Proposing to tax robots or their use requires agreement on three fundamental issues: An adequate definition of the taxable entity; A delimitation of the taxable base; and an analysis of the type of tax to be applied.").

[20] *See* Colin P.A. Jones, *The Robot Koseki: A Japanese Law Model for Regulating Autonomous Machines*. 14 J. BUS. & TECH. LAW 403 (2019).

[21] Padmashree G. Sampath, *Industrial Policy 4.0: Promoting Transformation in the Digital Economy* 14 (Glob. Dev. & Env't Inst., Working Paper No. 18, 2018) ("Lastly, algorithms mimic majority outcomes, raising the question as to whose knowledge/worldview it is that gets propagated online. For example, search hits are determined on how many others searched for similar sites. This, by itself, propagates racial, social, and gender biases, reinforcing stereotypical identity issues that have been larger struggles in today's societies. In the very least, it raises important issues in decision-making—is the majority of any population the determining standard? Would that be a good basis for democratic societies? And if so, for which cases, and how do we determine different thresholds in AI based decision making? A good, but limited, example of this is Google's flu predictor which consistently overpredicted the incidence of flu in 2011–2012 and 2012–2013, based on the number of people who searched for symptoms.").

compliance, but it may also have the potential to change the framework of tax policy entirely. Or, perhaps an advanced AI would determine, by a process of "actualing" cash flows, as explained below, that if all AIs engage in tax structuring to reduce aggregate tax remittances toward or near zero, then that drastic reduction in government revenue would trigger a fiscal catastrophe causing a mutual economic loss. Thus, each AI might then develop a course of action based on coordination with other AIs or even a theoretical game paradigm with a better outcome for a group of advanced AIs through the voluntary remittance of tax.

Once an advanced AI begins to develop its own understanding of social norms of tax avoidance behavior, it seems fair to say that the era of tax ideology of the last six decades centered in the United States will then be over. That is, the moral standards previously used to formulate tax policy will become formally irrelevant unless humans are somehow able to translate our morals to machines. In other words, the tax ideology which permeates the politicized processes of tax policy formation, as was carefully detailed by Louis Eisenstein some time ago, would thereby be rendered obsolete.[22] An alternative method to tax ideology to formulate tax policy may also arise, referred to here as "tax actualing" where an advanced AI with a sufficient set of data with respect to cash flows and tax remittances through the economy uses data to make accurate predictions. So, advanced AI will set out to "actual" and not to "model" in the formulation of tax policy. Such a process of "tax actualing" would represent a significant leap forward in tax policy at least by present day standards.[23]

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[22] *See generally* LOUIS EISENSTEIN, THE IDEOLOGIES OF TAXATION (1961) (examining the tax ideologies that have developed through a democratic society).

[23] In the near future, by a process of "tax actualing" and deep learning, an advanced AI may also be able to forecast the "social costs" of all types of taxation. Future tax policy debates will center on which "social costs" and/or "social benefits" should be included in the tabulation to formulate tax policy.

II. EXPANDED TAX TECHNICAL ANALYSIS OF ROBOT TAX PROPOSALS

The initial inquiry of *should robots pay taxes?* emerged from Bill Gates' famous proposal,[24] and continued with the development of the various methods by which robots might be subjected to tax. Many legal scholars argue that tax rates on human workers are high in the United States, especially after the Tax Cuts and Jobs Act of 2017,[25] and this appears also to be true in many nations beyond the United States.[26] If robots were to pay taxes, it could reduce the high

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[24] *See* Kevin J. Delaney, *The Robot That Takes Your Job Should Pay Taxes, Says Bill Gates*, QUARTZ (Feb. 17, 2017), https://qz.com/911968/bill-gates-the-robot-that-takes-yourjob-should-pay-taxes [https://perma.cc/GXX8-5L9A] ("Exactly how you'd do it, measure it, you know, it's interesting for people to start talking about now.").

[25] Soled & Thomas, *supra* note 1, at 8 ("Labor income bears the nation's highest tax burden, which is largely attributable to the fact that it is taxed twice. First, the Code imposes an income tax on labor earnings. More specifically, depending upon the taxpayer's filing tax status (i.e., single, married, or head of household) and income level, labor earnings are subject to income tax rates ranging from 10 percent to 37 percent. Second, upon the very same earned income, the Code imposes employee and employer payroll taxes, which amount to an additional tax burden of roughly 15 percent.") (citations omitted); Mazur, *supra* note 1, at 281 ("As our economy continues to evolve to one that increasingly relies on robots and other capital assets, this taxation disparity creates many negative externalities and is no longer justifiable. Thus, the automation revolution provides yet another reason to reevaluate the tax preferences granted to capital income.").

[26] *See* Luminița Ionescu, *Should Governments Tax Companies' Use of Robots? Automated Workers, Technological Unemployment, and Wage Inequality*, 14 ECON. MGMT. & FIN. MKT. 64, 66 (2019) ("The tax system is formulated to charge labor and not capital, tax schemes possibly leading to automation in situations in which companies would opt for a human worker: the present tax system is organized to mainly impose a tax on human workers and not on robot ones, generating a context in which companies choose robots as considerably less tax per amount produced is collected or cancelled as regards an automated worker."); Germana Bottone, *A Tax on Robots? Some Food for Thought,* 2 (Ministro dell'Economica e delle Finanze DF, Working Paper No. 3, 2018) ("[T]he literature in favour of a robot tax highlight that labour taxes are very high as they include also payroll taxes, while capital taxation is more favourable also because policy makers aim at fostering private investments, infringing the principle of neutrality with a view to promote economic growth.").

tax rates on human labor.[27] Tax policy discourse in the context of automation, therefore, might focus on a prospective determination of which tax system design humans should expect advanced AIs to voluntarily agree to comply with, and which tax systems might yield a response along the lines of a Libertarian will to tax avoidance by an advanced AI. The criteria below address this in the category of "incentives" set forth below.

At least 11 methods of robot taxation have been proposed thus far: (1) An "automation tax" similar to unemployment insurance ("UI") schemes where tax is to be levied as firms lay-off human workers and switch to robots;[28] (2) imputation of a "hypothetical salary" of robot workers taxable as wages;[29] (3) specific disallowances of business tax deductions to firms that use robots as

[27] Mazur, *supra* note 1, at 317 ("Advances in robotics and other forms of artificial intelligence present an added impetus for taxing capital. First, as discussed above, the growing use of automation is transforming the labor market and is likely to result in a decrease in labor income for a period of time. With a declining return to labor, a tax system that heavily relies on the taxation of labor income will be unsustainable. Taxing capital, a rapidly growing source of production, will help mitigate the decline in tax revenues.").

[28] Xavier Oberson, *Towards Taxation of Robots or Their Use?*, INT'L TAX REV. 2 (Jan. 30, 2018) [hereinafter Oberson, *Towards Taxation*] ("Based on the premise that a robot will replace a human being, including the salary which the latter would receive, a tax could be envisaged on the 'hypothetical salary imputable' to robots, corresponding to what the robot would receive for equivalent work carried out by humans.").

[29] Xavier Oberson, *How Taxing Robots Could Help Bridge Future Revenue Gaps*, OECD (2017) [hereinafter Oberson, *How Taxing Robots*], http://www.oecd.org/forum/oecdyearbook/how-taxing-robots-could-help-bridge-future-revenue-gaps.htm [https://perma.cc/RQ3H-D3VD] ("One possible solution would be to levy an income tax on the 'imputed hypothetical salary the robots should receive from equivalent work done by humans.'").

workers;[30] (4) value added taxation ("VAT") on robot activities;[31] (5) levy of Pigouvian taxes to the extent of robot externalities;[32] (6) grant of offsetting tax preferences to human workers to match those available for robots;[33] (7) levy of a "corporate self-employment tax" on corporations that do not employ many human workers;[34] (8) inclusion of "negative depreciation" on robots,

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[30] Abbott & Bogenschneider, *supra* note 1, at 169 ("A first option is to attempt to disallow the respective corporate income tax deductions for capital investments that give rise to the automation tax benefit. The basic idea is to reverse each of the tax benefits accruing in the case of worker automation in relation to avoidance of levy of wage taxes, accelerated or timing difference of deductions, and indirect tax benefits.").

[31] Bottone, *supra* note 26, at 16 ("Finally, a value-added tax on the activities performed by robots could be levied in the same way the VAT is applied to self-employed, paying attention to safeguard the neutrality of VAT system."); Bendel, *supra* note 1 ("Another answer could be to raise a robot tax . . . . The robot tax is a characteristic of the machine tax, which in turn can be understood as a value added levy.") (*citing* Oliver Bendel, *Robotersteuer*, GABLER WIRTSCHAFTSLEXIKON, http://wirtschaftslexikon.gabler.de/Definition/robotersteuer.html [https://perma.cc/Z8GD-9PQW]); Oberson, *How Taxing Robots*, *supra* note 29 ("Another interesting possibility is the application of a value-added tax on robots' activities. At first sight, neutrality should prevail. This would tend to apply the VAT to robot activities in a similar way to comparable human activities.").

[32] Bronwyn McCredie et al., *Navigating the 4th Industrial Revolution: Taxing Automation for Fiscal Sustainability*, AUSTL. J. OF MGMT. 11 (2019) ("While that may be the case, a Pigouvian tax on automation is a 'natural and obvious' solution . . . which will immediately address the impact of the 4th industrial revolution by forcing businesses to internalise externalities."); Robert Shiller, *Why Robots Should be Taxed if They Take People's Jobs*, GUARDIAN (Mar. 22, 2017) https://www.theguardian.com/business/2017/mar/22/robotstax-bill-gates-income-inequality [https://perma.cc/DK7B-VMC5]; Ooi & Goh , *supra* note 15, at 7, 8 (identifying problem with Pigouvian taxes in identifying the amount of the externality to be offset by taxation, and stating "[t]he alternative to directly observing the size of the externality generated is to infer its size from observations of the intensity or extent of the agent's externality-generating actions. This is usually achieved in the following way. First, the intensity or extent of the agent's externality-generating actions is quantified and measured in terms of a chosen unit of taxation, and then used as a tax base.").

[33] Abbott & Bogenschneider, *supra* note 1, at 171 ("A third option is to attempt to grant offsetting tax preferences for firms that employ human workers for each category of tax benefit.").

[34] *See* Mazur, *supra* note 1, at 309.

as capital assets;[35] (9) levy of an automation fee on robots payable into a sovereign wealth funds for investment;[36] (10) fee-based "tradeable permits" similar to carbon permits for robots;[37] and (11) increases in the general corporate tax rate.[38]

A. *Proposed Categories of Tax Neutrality, Avoidability, Incentives & Revenue*

The initial difficulty in tax policy analysis is identifying the categories to be used for the evaluation of competing policy proposals. Tax scholarship is defined by the hundreds of such categories that range from economic theory, to mere simplicity, to fairness, and many more. Fairness, for example, can be measured in a myriad of ways often premised in philosophical standards of

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[35] Robert Goulder, *Taxing Robots: Is Negative Depreciation in Your Future?*, 95 TAX NOTES INT'L (Sept. 16, 2019) https://www.taxnotes.com/tax-notes-today-international/tax-technology/taxing-robots-negative-depreciation-your-future/2019/09/17/29xph [https://perma.cc/CF48-CEEW] (explaining that negative depreciation is similar or equivalent to an "appreciation tax" which has also been proposed for robot taxation); *see* McCredie et al., *supra* note 32, at 13 ("This paper proposes an appreciation tax, a tax on capital appreciation (as opposed to depreciation) which is accrued annually instead of on realisation of the capital item, that is, when sold. This proposed tax is particularly relevant given the unique nature of the 4th industrial revolution where the growth of automation is considered exponential due to the self-learning capabilities of artificial intelligence.") (citing *Artificial Intelligence and Robotics and Their Impact on the Workplace*, INT'L BAR ASS'N (2017), https://www.ibanet.org/Document/Default.aspx?DocumentUid=c06aa1a3-d355-4866-beda9a3a8779ba6e [https://perma.cc/5BRJ-YPHP]).

[36] McCredie et al., *supra* note 32, at 5 ("Lastly, an automation tax, where firms pay additional amounts into an insurance plan or sovereign wealth fund if they automate at the expense of workers, has been widely proposed . . .") (citations omitted).

[37] Fabio D'Orlando, *Technological Unemployment and the Resurgence of Political Economy*, 15 AM. REV. POL. ECON., June 28, 2020 at 11. https://www.arpejournal.com/wp-content/uploads/sites/2/2020/06/Vol15No1TechUnemploy.pdf [https://perma.cc/6U85-K42B] (proposing tradeable permits approach to robot taxation).

[38] Abbott & Bogenschneider, *supra* note 1, at 172 ("A fifth option would be to significantly increase the corporate tax rate, with the intent of increasing the relative portion of the tax base borne by capital and decreasing that borne by labor.").

morality developed through the ages,[39] and each with its own implicit method of accounting for taxes paid to determine the results. Hence, in the context of robot taxation, any policy proposal can be challenged both by varying the categories to measure results, and also, by varying the method of accounting to count the results pursuant to those categories.[40] The latter can be illustrated foremost by economic theory, where economists have defined categories of efficiency and then invented dozens of novel accounting methods related to different categories that apply in various contexts. In many matters of tax policy, including robot taxation, economic analysis can only be applied by adopting special accounting methods.

Of particular importance to robot tax policy, the payroll taxes paid by workers in cash by paycheck withholding are not counted in the respective economic efficiency analysis because these are assumed to be offset by future social benefits, and thus to bear no deadweight loss reflecting an efficiency subtraction to economic

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[39] *See* Jeffrey A. Schoenblum, *Tax Fairness or Unfairness? A Consideration of the Philosophical Bases for Unequal Taxation of Individuals*, 12 AM. J. TAX POL'Y 221, 223 (1995). In the context of robot taxation, see Julian Arndts & Kalle Kappner, *Taxing Artificial Intelligences* 16 (Inst. for Rsch in Econ. & Fiscal Issues, Working Paper No. 201902, 2019) ("To sum up, there is a much stronger case for taxing the artificial intelligence and a much weaker case for taxing the human, ceteris paribus. It's true that we have no certainty whatsoever as to whether or not humans, or artificial intelligence, have utils, natural rights, consciousness, dignity, and libertarian free will . . .").

[40] *See* BRET N. BOGENSCHNEIDER, HOW AMERICA WAS TRICKED ON TAX POLICY: SECRETS AND UNDISCLOSED PRACTICES 5 (2020) [hereinafter BOGENSCHNEIDER, AMERICA] ("Of course, various philosophers have encouraged the wealthy to believe that the tax system should be considered 'fair' by creating special accounting methods to be creatively applied on a noncash basis within their own moral frameworks. These special accounting methods make it possible to say that the wealthy should be assumed to have paid a proportionate share of taxes to then allow for a supposed 'redistribution' for basic needs in the 'welfare state,' as example. In any case, the results are thereby twisted to such a degree that some background in accrual accounting (or even forensic accounting) is helpful in attempting to apply the many special accounting methods of moral philosophy to tax policy.").

results.[41] Yet, a different accounting method is applied to taxes paid by capital, such as robots, so that taxes paid do create an efficiency subtraction to economic results.[42] The mismatch means it would not be ideal for robots to pay any taxes if only capital taxes are deemed to create efficiency losses. Tax policy results can then be known logically by this method without the need for evidence, but at the cost of the creation of an entirely new accounting method that may or may not correspond very well to reality.[43]

1. *Category of Tax Neutrality*

The concept of "tax neutrality" simply refers to the discriminatory treatment afforded to labor as opposed to capital under the tax laws;[44] further, it is axiomatic that capital is favored in

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[41] For an explanation of the term "Deadweight Loss," see Martin Feldstein, *Tax Avoidance and the Deadweight Loss of the Income Tax*, 81 REV. ECON. & STAT. 674, 674 (1999).

[42] Mustafa Erdoğdu & Coskun Karaca, *The Fourth Industrial Revolution and Possible Robot Tax*, *in* INSTITUTIONS & ECONOMIC POLICIES: EFFECTS ON SOCIAL JUSTICE, EMPLOYMENT, ENVIRONMENTAL PROTECTION & GROWTH 103, 116 (Irem Berksoy et al. eds., 2017) ("[I]n some environments the taxation on robotic systems is interpreted as an opportunity to make up for lost tax revenue. However, there is a risk that such a policy, which is capitalized on capital accumulation, will cause the tax issue to be eroded instead of increasing the tax revenue. The phenomenon is known as 'the tax depreciation' in the literature.").

[43] The special accounting methods of economics are foreign to tax practitioners because no such offsets are incorporated to either book or tax accounting under GAAP standards, for example. If economic theory simply defines capital taxes as creating an efficiency loss, and other taxes not to give rise to an efficiency loss, then it does seem fair to question that framework absent empirical evidence. The scholar David Hemel has gone further to begin to blur the line between the definitions of capital and labor as typically used in tax accounting. This is to treat robots as labor in the accounting method for taxes paid, but not the theory of economics, and further, to reverse basic principles of accounting, that is, Accounting 101 definitions for capital and labor costs. Although, these issues will be addressed in further detail below, tax practitioners might respond simply that they are unwilling to abandon the long-established working definitions of capital and labor, nor the accounting methods typically applied in the tax context.

[44] Cynthia Estlund, *Three Big Ideas for a Future of Less Work and a Three-Dimensional Alternative*, 82 LAW & CONTEMP. PROBS. 1, 35 (2019) [hereinafter Estlund, *Ideas*] ("[T]ax policies can tilt firms' incentives toward employment of labor versus capital (or at least undo the perversely opposite tilt

economic theory.[45] Since robots are a type of capital, as robots increasingly perform work, one question for tax scholars is whether human workers can be treated relatively worse than automated workers under the tax system and still maintain economic efficiency.[46] That inquiry is an entirely logical and a reasonable line of inquiry as robots take on human work and begin to erode the tax base. Tax policy should therefore begin to evaluate various proposals on the grounds of relative neutrality between robot and human workers.[47]

2. *Category of Avoidability*

A severe problem for tax policy relates to the nature of tax law and whether results can be known under the tax code. A preliminary question is *are results under the tax code fully deterministic?* That is, can one simply read the tax laws and determine the end results, or is legal interpretation and perhaps judicial lawmaking part and parcel to determining the tax law? In this Article, the presumption is

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of our current tax system)."); Mazur, *supra* note 1, at 313 ("Contrary to this favorable tax treatment, labor income bears a heavier tax burden. It is generally taxed on an annual basis at ordinary income tax rates and any preferential tax treatment it receives is limited and substantially less than that received by capital income.").

[45] Tyers & Zhou, *supra* note 4, at 6 ("Payroll taxes generate more revenue than capital income taxes in many countries, and these can encourage the displacement of workers even when it is not otherwise efficient. In the US there is a further incentive to automate because firms can claim accelerated tax deductions for automation equipment, but not for human wages. Less directly, human workers are also consumers who pay consumption taxes, such as retail sales tax (RST) in the US or value added tax (VAT) in the UK. Because robot workers are not consumers, they are not subject to these indirect taxes and so firms can avoid any associated burden. Pre-existing tax policies are therefore not 'neutral' as between robot and human workers, but instead favour automation.").

[46] *See* Mazur, *supra* note 1, at 296 ("A 'robot tax,' also referred to as an 'automation tax,' is essentially a tax on companies that use robots or automated technologies that replace human workers. When humans perform work, that work is subject to both income and payroll taxes, whereas the same work performed by a robot is not subject to the same level of tax. A robot tax seeks to level the playing field and tax robots comparably to the humans that they are replacing.").

[47] *But see* Englisch, *supra* note 4, at 10 ("But it is hard to build a tax neutrality case for taxing the use of robots even based on an analysis of real economic incidence.").

that tax laws are not deterministic in practice and that taxpayers are able to engage in factual structuring to avoid tax. Tax policy should therefore consider the potential for avoidability of tax assessments under various tax regimes or proposals.

3. *Category of Incentives*

In the context of tax policy, the term "incentives" often refers to efficiency incentives thought to be relevant to taxation. Incentive ideas are often derived from economics, given the predominance of economic theory to tax policy. Robot taxation is an illustration of this as robots are taken to be efficient, and therefore banal versions of economic analysis conclude that investment in robots should be incentivized by the tax code merely because robots are thought to be efficient. As explained in other papers, the value of tax deductions is foremost in the practice of tax accounting and lawyering but is severely de-prioritized within economic theory. Tax deduction values are de-prioritized because only the marginal rate of return is calculated in standard economic modeling; such method ostensibly accounts for the deductibility of capital investment by calculating a reduced rate of return from taxation using the marginal rate.

On the other hand, tax practitioner planning places tax deductibility foremost where the economic rate of return is taken as constant and the value of tax deductions is calculated under different scenarios, such as a decision about whether to place an automated factory in South Korea or Panama. Here, the term "incentives" refers not to economic efficiency, but to the availability of tax deductions for robots representing capital investment to tax planners. If tax deductions are available for capital investment such as robots, then the idea is that an incentive is provided for robot investment. Thus, in the illustration presented above, South Korea would have an incentive toward robot investment within its borders because capital investment is deductible against income for a firm that is already profitable in that jurisdiction; Panama offers no incentive toward capital investment because the value of tax deductions is nil in that jurisdiction.[48]

[48] The after-tax rate of return is not foremost in the incentive analysis because transfer pricing methods will shift income out of South Korea anyway as the robots manufacture products.

4. *Category of Revenue*

Here, revenue refers to the potential tax proceeds from the various proposals. The ratings provided are merely the preliminary views of the author, and not intended to substitute for an empirical study.

B. *Table of Robot Tax Proposals with Policy Effects*

The following is a summary of the category analysis for the various robot tax proposals. Notably, ratings are provided by the author, but the point is more to provide the categories for analysis as the ratings will be the subject of ongoing debate now and in the future.

Type		**Neutral**	**Avoidability**	**Incentives**	**Revenue**
1.	Automation Tax similar to UI	Yes	Low	Poor	Moderate
2.	Imputation of Hypothetical Salary	Yes	Low	Moderate	High
3.	Disallowance of Tax Deductions	No	Moderate	Poor	Moderate
4.	VAT on Robot Activities	Yes	Low	Terrible	High
5.	Levy of Pigouvian Taxes	No	High	Excellent	Low
6.	Grant of Offsetting Tax Preferences	Yes	N/A	Excellent	Negative
7.	Corporate Self-Employment Tax	Yes	Low	Poor	High
8.	Negative Depreciation on Robots	No	Low	Moderate	Moderate
9.	Automation Fee	No	Moderate	Terrible	Moderate
10.	Tradeable Permits	No	Highest	Excellent	Low
11.	Increase in Corporate Tax Rate	No	High	Excellent	Moderate

1. *Critiques of Proposals for Robot Taxation*

Academic research on robot taxation has turned to analyses of potential drawbacks of the various methods of robot taxation as set forth above.[49] The primary drawbacks to robot taxation identified thus far are as follows:

(a) Productivity losses on taxing robots;

(b) Additional complexity inherent to all of the robot tax proposals;

(c) Difficulty in identification of "robots" as capital; and

(d) Inability to capture benefits from capital assets.

Each of these criticisms taken from academic literature will be addressed in the following paragraphs.

a. *Productivity Losses on Taxing Robots*

A host of scholars oppose any taxation of robots on the grounds that robots must be presumed in all cases to increase economic productivity.[50] Yet, prior analyses refer in part to the removal of some tax incentives for robots to make the tax code "neutral" (or more neutral) between human workers and robots. Tax neutrality between human workers and robots would in many cases enhance economic productivity. Productivity gains are thought to occur by reducing tax incentives toward over-investment in robots in

[49] *See generally* Erdoğdu & Karaca, *supra* note 42, at 115 ("One of the criticisms of robot tax is that, if the goal is to generate additional income to the state, there are many other tax alternatives. It is claimed that these tax alternatives are highly efficient taxes, which [are] likely to cause less welfare loss. Taxes collected on cigarettes, alcohol and fossil fuels are shown as examples.").

[50] The question was also posed by Mazur. Mazur, *supra* note 1, at 299 ("Moreover, if robots are in fact increasing productivity, especially in relation to other capital investments, then why do we want to discourage their use?"); *see also* Ene, *supra* note 15, at 21 ("[T]he overall positive effects of productivity growth on all the other industries were offsetting the negative effects in the industries where productivity growth was decreasing. However, data shows that productivity growth in the manufacturing industry has had a more negative effect on internal employment, while its external effects of productivity growth on other sectors have become less positive for reasons including computerisation.") (citations omitted).

situations where a human worker could do the job more efficiently apart from the favorable tax treatment currently granted to robots.[51]

Modern tax policy is premised on the assumption that "social costs" of taxation, such as the deadweight loss of income taxation of high-earners, diminishment of capital investment, or any other disincentive or harmful effects of taxation, accrue only against large corporations and high-income individuals. Although this assumption has never been supported by reasonable empirical evidence, the premise applied by economists is that workers always bear the incidence of capital taxes.[52] Economic theory does not account for measurable social costs to workers due to high rates of wage taxation. Accordingly, tax policies are evaluated without any subtraction for the social costs of worker-level taxes or disincentive effects to small businesses from high rates of taxation. This premise is the main reason why corporate tax competition is thought to be beneficial to the economy, despite the lack of any empirical evidence to support that modeling parameter.[53] If productivity losses

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[51] Mazur, *supra* note 1, at 313 ("The current income tax system significantly favors capital income over labor income. It grants numerous tax preferences that essentially subsidize capital relative to labor. The most prominent of these preferences is a reduced tax on capital gains and dividend income. Other favorable tax provisions include deductions in the form of expensing and accelerated deductions, the tax credit for certain research and development expenses, and various provisions that allow capital owners to defer their gains. The recent 2017 tax legislation provides additional benefits to holders of capital income through measures such as large tax cuts for corporations, additional deductions for certain pass-through entities, and immediate expensing of qualified capital purchases.") (citations omitted).

[52] Englisch, *supra* note 4, at 10 ("Thus even based on real economic incidence, there is no convincing case for imposing similar wage tax and payroll taxes on 'deemed wage income' of robots. While it appears highly likely that in most jurisdictions, at least a significant portion of the wage and payroll taxes is effectively borne by the human workers, such a tax burden cannot possibly be shifted forward to the robot itself.").

[53] Bottone, *supra* note 26, at 19 ("The taxation on robots is very controversial as it may intensify tax competition among different jurisdictions. Therefore[,] a global effort is required to include this topic in the international agreements about the common rules of taxation to be established in order to face global tax evasion and elusion.").

from worker taxation are posited, then reversal of high taxes on workers might result in productivity gains as well.

b. *Additional Complexity*

Some scholars oppose robot taxation on the grounds of additional complexity.[54] A series of articles and rejoinders along these lines emerged cleverly entitled: "Should my dishwasher pay taxes?"[55] The concern is that the legal line between a robot android and a dishwasher may at some point become so elusive that the tax law would then become prohibitively complex.[56] On first impression, it seems correct that classifying robots might be an

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[54] Englisch, *supra* note 4, at 22 ("Any justification would have to outweigh the concern that a tax on robots is liable to result in distortions, complexities, and reduced growth, all the more so in a globalised economy with intense international tax competition."); Mazur, *supra* note 1, at 301 ("A robot tax is also likely to add more complexity into our tax system. With additional complexity, there is an increased risk of tax non-compliance, as companies may not know how much tax they are required to pay, and of enforcement difficulties, as tax authorities may not be able to verify the accuracy of the asserted tax liability.").

[55] *See* Tatiana Falcao, *Should My Dishwasher Pay a Robot Tax?* 90 TAX NOTES INT'L 1273 (2018); *see also* Thomas Davenport, *Advancing the Debate on Taxing Robots*, FORBES (June 13, 2019, 11:16 AM), https://www.forbes.com/sites/tomdavenport/2019/06/13/advancing-the-debate-on-taxing-robots/#23cddcff25a4 [https://perma.cc/QY5M-92P5] ("Should all automation devices be taxed—from spreadsheets to dishwashers?").

[56] *See* Oberson, *Towards Taxation*, *supra* note 28 ("To be taxable, robots must be clearly legally definable. This task is in fact rather tricky. Some legal definitions have, however, already been suggested (as in the European Parliament report). They all tend to concentrate on the autonomy of robots and their decision-making process. From a tax standpoint, attention should perhaps, be paid to the use of AI that enables robots to take decisions, to act autonomously and to learn in a manner that surpasses the abilities of a simple machine. In this context, the shape of the robot (i.e. whether it has a human appearance or not) seems, to us, to be irrelevant."); Erdoğdu & Karaca, *supra* note 42, at 115 ("The second criticism of robot taxation is related to how the tax issue will be determined. Together with this sort of tax, it is admitted that the robots cause unemployment but there is no explanation about what the tax issue will be. Because 'robots' are not always easy to identify."); Arndts & Kappner, *supra* note 39, at 6 ("As has been noted, many proposals suffer from unclear definitions of what exactly constitutes a robot, or AI, respectively.") (citation omitted).

administratively difficult task for the tax system,[57] but one should also ask whether it is any more difficult than other tasks of tax compliance.[58] Surprisingly, the answer appears to be clearly not. The owners of all capital assets, including machines of all sorts, are required under present tax law to classify how particular machines are to be used. Dishwashers, for example, may have a different tax treatment depending on how the owner uses the dishwasher such as in a business or for personal purposes.[59] The classification of the machine determines its tax treatment, and the classification is processed as a matter of self-reporting which is typically investigated by the Internal Revenue Service ("IRS") during an audit. The same method would presumably be applied for robot androids where the owner would be required to classify the android for tax purposes. Thus, a corporation could set out to treat an android as a human taxpayer and would presumably register it with the federal government and obtain a taxpayer identification number; presumably the Feds would be only too happy to issue such a number since no social security benefits would be payable upon

[57] Englisch, *supra* note 4, at 16 ("Second, a targeted approach will entail significant complexity, especially in defining the scope of the tax, resulting in high administrative and compliance costs.").

[58] Mazur, *supra* note 1, at 298 ("One of the main questions that a robot or automation tax raises is: How do we define a 'robot' for these purposes? The question is more complicated than robot tax proponents make it seem. Is a 'robot' any type of machine that replaces a human job with automation? Does the definition include bots-robots programmed to perform tasks online? Does the definition necessitate physical qualities, or can it include intangible software or algorithms that allow a computer to work as a doctor, lawyer, or architect?").

[59] Only if someone tasks an android to work in their business and also to perform personal services, like washing dishes, and *then* attempt to depreciate the android as a business asset, would they *then* have an issue on audit that would be administratively complex that might require determination of an allocation method. But this is not administratively complex more so than with dishwashing machines today that are split between personal and business use. If someone were to task an android to provide personal services and wash dishes in their home exclusively, this would not create any problem of administrative complexity; if someone tasks an android to work for them as an employee, the wages are deductible, but the android is not depreciable under standard tax rules; if someone tasks the android to work for them in a trade or business as a robot, the cost of the android is depreciable.

retirement or disability.[60] This does not seem to raise any concern over administrative difficulty for the tax system, as the self-classification of all machines based on use is implicit to the current operation of the tax system.

Furthermore, many factual determinations in tax are indeed complex and might raise a classification issue on audit, and rightfully so. Hobby farms, for example, require a multi-part test (that seem to so often stymie the romanticism of the rural hippie lifestyle);[61] home office determinations are admittedly complex (even for accountants who work at home);[62] and legal entity identification was at one point complex (until the famous implementation of the check-the-box rules simplified identification of legal entities,[63] which created the foundation for widespread corporate tax avoidance today). Likewise, it does seem possible that distinguishing dishwashers from other robots as a factual inquiry might someday be just as difficult as some of our colleagues have pointed out, but that is not really an important policy consideration.

c. *Difficulty in Identification of "Robots" as Capital*

Another issue of identification in robot taxation is the categorization of robots as capital.[64] David Hemel argues that engineers develop capital assets and the engineers are paid as workers and taxed under the system of labor taxation; therefore, robots might be recategorized as a type of labor by imputing the taxes paid by engineers to the robots, heroically assuming the

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[60] It has been suggested that there is a concern over whether the Social Security department would opt to pay benefits to robots. The answer seems to be simply, no. Any robot that pays into the Social Security or Medicare systems with a Federal Taxpayer Identification Number (TIN) would simply not be eligible to receive any benefits. *But see* Atkinson, *supra* note 2, at 8 ("Would tax authorities such as the IRS put a robot that did not pay its taxes in jail? If the robot is paying social security taxes, could it retire after 40 years and collect social security? If the robot breaks, does it get disability pay?").

[61] *See* I.R.C. § 183.

[62] *See id.* § 179.

[63] Treas. Reg. § 301.7701-2 (2019).

[64] Mazur, *supra* note 1 ("But what is a 'robot' for these purposes, how do we measure how much income it generates, and what is the purpose of this line drawing?").

engineers were both categorized for tax purposes as employees and working within the United States.[65] Hemel writes, "[t]he claim that robots represent 'capital'—more often asserted than explained—turns out to be less obvious than it might appear initially. The cost of a robot is also—and is perhaps principally—the cost of the engineers and other highly skilled workers who design and produce the robot."[66] Hemel's argument does not reflect the reality that most robots would typically be purchased as a capital asset from a third party manufacturer, and then placed in service by a company operating the robot as a capital asset, for purposes of both tax and book accounting.

Nonetheless, some specialized robots are self-produced by the ultimate user of the robot where the labor to produce the robot could be taxed and then taken as translated into the machine under the novel accounting method proposed by Hemel. Even so, as a matter of both tax and book accounting, such costs are still capitalized into a capital asset and subject to depreciation or amortization as a matter of both tax and generally accepted accounting principles ("GAAP"); some portion of the costs might even be immediately expensed (or treated as repairs), which would yield an immediate expense and even greater tax advantage to capital. As was previously explained in the Abbott and Bogenschneider article, capital assets have an extended useful life; through immediate expensing of robot development costs, accelerated depreciation, or amortization of robot development, costs typically yield a much faster tax deduction than the alternative stream of future wages that would be paid to workers over the useful life of the robot.[67] At the very least, it is axiomatic that robots are generally capital assets and properly identified as such under basic principles of tax law and accounting. Furthermore, any portion of intangible costs of automation or robot production, which is not capitalized and to which tax expensing might thereby be obtainable, yields an even greater tax advantage.

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[65] Hemel, *supra* note 18.
[66] *Id.*
[67] Abbott & Bogenschneider, *supra* note 1.

d. *Spillovers and Inability to Capture Benefits*

A few other responses to robot taxation were also given by Atkinson as: (i) loss of potential benefits of "spillover effects" from capital investment,[68] and the argument that (ii) firms may be unable to capture the full benefits of capital investment.[69] Spillover effects are often given as an argument in favor of the non-taxation of multinational firms. Perhaps the best evidence of spillover effects is the nation of Cuba, where by limiting foreign investment, technological advancement appears to have been inhibited. However, empirical evidence has also emerged that multinational firms "crowd out" domestic capital investment thereby creating a negative effect from foreign capital investment.[70] For example, as Starbucks has moved into European markets, local coffee shops have died-off at least in part because small coffee shops are unable to engage in transfer pricing methods and are therefore subjected to

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[68] Tyers & Zhou, *supra* note 4 ("There are interactions between nations, however. Spillovers from successful nations stem from their greater capital income, increased saving and lower real interest rates. In today's integrated global financial market this raises investment and the capacity for innovation in other nations as well. The bulk of new investment is concentrated in the leader, however, with the medium run consequence that capital accumulation is faster there and, with reduced low-skill wages, its real exchange rate depreciates."); *see* Atkinson, *supra* note 2, at 15.

[69] Atkinson, *supra* note 2, at 16 ("There are a number of reasons why firms are unable to capture all the benefits from their investments in capital equipment. One is that investments in new machinery give workers knowledge about these new investments that they then disclose to their next employer, which is then incentivized to also invest in that same new machinery. Indeed, users of new equipment learn what modifications need to be made and then transfer this experience to other firms through a host of means, including interfirm labor movement, trade shows, and professional association meetings. In addition, some equipment, especially information technology, has network effects wherein the benefits to other firms from a firm adopting the technology are significant. As Hitt noted, 'Firm level investments in communications technologies can create benefits for business partners. Alternatively, investments in information technologies can produce knowledge that can spill over between firms.'").

[70] *See generally* Koen De Backer and Leo Sleeuwaegen, *Does Foreign Direct Investment Crowd Out Domestic Entrepreneurship*, 22 REV. OF INDUS. ORG. 67 (2003) (discussing the effect of foreign direct investment for domestic entrepreneurs).

effective tax rates on any profits several times higher than Starbucks.[71] The truth is that small business owners are unable to compete with Starbucks given the tax system which heavily favors large corporations. The technical answer to Atkinson is that spillover effects from capital investment are indeed beneficial, but crowding out effects from capital investment such as tax policy are harmful to small businesses, and the optimal economic policy depends on the circumstances. The evidence so far indicates that the harmful effects of crowding out probably exceed the beneficial effects of spillovers at least some of the time.

Atkinson also argues that multinational firms are unable to capture all the benefits of capital investment.[72] The idea appears to be that multinational firms should not be taxed because there are social benefits to capital investment that accrue partly to other owners of capital. Another version of this argument has been championed by Richard Epstein, who argues that the taxation of property is immoral because it would tend to change the rank-ordering of persons as measured in wealth holdings; which reflects the Enlightenment era means of economic thinking where tax policy would be considered fair if it did not change the rank-ordering of persons in land or slave holdings.[73] First, an appropriate answer to Atkinson is simply that capital is often able to capture some, if not nearly all, of the economic return arising from labor. Hence, the return on capital investment is actually too high because it captures the return that should have been allocated to workers, and that economic distortion is so large that questions like whether the tax system should be designed to better allow Microsoft to capture all the benefits of the Windows operating system later.

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[71] Richard Murphy, *Starbucks Avoiding Tax has a Knock-on Effect on Homegrown Business*, GUARDIAN (Oct. 16, 2012), https://www.theguardian.com/commentisfree/2012/oct/16/starbucks-tax-british-business [https://perma.cc/9FGJ-LWAH].

[72] Atkinson, *supra* note 2, at 16 ("But when a firm buys new equipment or software, it is not likely to capture all the benefits because other firms are able to boost their own productivity as a result. This is one of the key economic rationales for preferential tax treatment of investing in equipment.").

[73] Richard A. Epstein, *Taxation in a Lockean World*, 4 SOC. PHIL. & POL'Y 49 (1986).

Second, even if there are fairness concerns created between capital holders caused by taxation, those concerns are less important than the collective concern manifested by Warren Buffet's hypothetical secretary that her effective tax rate is much higher than Buffet's.[74]

2. *Response to Critics*

a. *Failure to Acknowledge Possibility of Over-Investment*

In the specific context of robot taxation, various economists have proposed that in all cases robot workers are more efficient than human workers.[75] But, supply and demand are presented in economic theory as a function of variables and not as a rule in favor of tax exemption for one factor taken to be mobile. Economic functions present relations between variables and are not intended to be rendered as an outright rule taken irrespective of the factual circumstances relative to supply and demand. To the contrary, it should be seen as at least possible that analyses of supply and demand functions could indicate an over-investment in robots or other types of automation in an economy. Since a broad consensus among tax and legal scholars now exists that the tax system does favor robots as a type of capital investment, it seems plausible to consider the possibility that an over-investment in robots and automation may have already occurred because of distortions created by the tax system.[76]

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[74] *But see* Atkinson, *supra* note 2 ("In some studies, researchers have accepted this reality, but then go on to assume that the lion's share of the savings is captured by 'capital' and little goes to labor, in the form of either higher wages or lower prices. In other words, these robot skeptics acknowledge that robots will boost productivity and overall economic output (GDP) will go up, but they then bizarrely predict workers' share of this will drop so much their actual real incomes will fall. This is not only illogical, history suggests it is wrong.").

[75] Davenport, *supra* note 55 ("Why should we tax something that leads to productivity—something our economy desperately needs?"); *see also* Atkinson, *supra* note 2, at 15 ("In other words, tax distortions such as the R&D tax credit or accelerated depreciation for investments in new equipment lead to more growth because these investments are more productive than others and have significant positive externalities.").

[76] Mazur, *supra* note 1, at 277 ("Rather, advances in robotics and other forms of artificial intelligence merely exacerbate the issues already caused by a tax system that undertaxes capital income and overtaxes labor income.").

b. *Method of Accounting in Calculation of the Tax Base*

Capital does not remit much tax relative to human labor. Such is technically true even in nations with ostensibly high statutory tax rates, including the United States prior to the Tax Cuts and Jobs Act of 2017, where the statutory corporate tax rate was reduced from 35% to 21%.[77] Tax practitioners observe merely that taxable income must be calculated as the first step under any system of income tax assessment. By determining taxable income in the first step, the magic of tax avoidance planning happens; hence, the statutory tax rate does not by itself determine the amount of tax to be paid. Economic theory addressed this concern as it always has in the context of tax policy—this is by the creation of a special accounting method for determining the amount of taxes deemed to have been paid by capital.[78] Here, robots are taken as a type of capital. Since the special accounting method is not cash based and constitutes a hypothetical, under the hypothetical, the taxes of shareholders, corporate executives, or even workers, are treated as if they were paid by the respective capital, even if capital does not pay any of those taxes directly. Hence, economic theory implies that even if robots do not pay income taxes directly, the various other types of taxes or even the taxes of shareholders or human workers are treated as if those taxes were paid by robots.

c. *Objective of Tax Neutrality between Robots and Human Workers*

Within economic theory there is no efficiency subtraction from economic results due to worker taxation,[79] but there is an efficiency

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[77] Tax Cuts and Jobs Act of 2017, Pub. L. 115-97, 131 Stat. 2054 § 965.

[78] For a summary of accounting methods, see SALLY JONES, ET AL., PRINCIPLES OF TAXATION FOR BUSINESS AND INVESTMENT PLANNING 6.6-6.14 (2020); *see also* BOGENSCHNEIDER, AMERICA, *supra* note 40.

[79] Englisch, *supra* note 4, at 9 (". . . justified as an equalisation levy? Contrary to what has been claimed in literature, taxing the use of robots as if they were human wage earners can also hardly be justified as a measure to restore a level playing field, i.e. on grounds of neutrality of taxation. Admittedly, the tax treatment of the two factors of production—capital and labour—differs, and so does, therefore, also the tax treatment of human workers and robots . . ."). *But see* McCredie et al., *supra* note 32, at 5 ("Alternate proposals that do not directly tax corporations due to fears of impeding or stagnating innovation include first, creating a tax neutral system which allows the market to choose the most efficient

subtraction for robot taxation. In other words, tax policy is presumed not to be symmetrical between human and robot workers. Because of this asymmetry between human and robot workers, it is possible to conclude that there would be no taxation of robots as a type of capital investment in the standard economic model as applied to taxation.[80] In a nutshell, standard economic doctrine applied to the topic of robot taxation gives a complete logical defense for the exemption of robots, as a type of capital, from taxation, always, irrespective of the particular circumstances that may arise now or in the future.

d. *Detailed Tax Technical Analysis*

In a recently published conference proceeding from a symposium on artificial intelligence and the future of tax law, Hemel proposed a series of detailed responses to one of the initial papers on robot taxation by Abbott and Bogenschneider.[81] Several of the positions taken by Hemel are summarized and addressed here as follows:

(1) Substitution of robots for human workers does not yield any tax advantage;

(2) Robots are comprised in significant part of intellectual property;

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unit of production, a human or a robot. For example, the South Korean 'robot tax' which removed tax incentives for investments in automated machines.").

[80] For the identification of the philosophical question of symmetry in the context of robot taxation, see Arndts & Kappner, *supra* note 39, at 1–15 ("If humans and artificial intelligences are similar in some or even all of those dimensions then by symmetry humans and artificials [sic] intelligences should be taxed in a similar way. Taxes on humans should not be higher than taxes on robots.").

[81] Hemel, *supra* note 18. A few of Hemel's assertions, including that (i) robots are not necessarily capital assets, and (ii) capital investments are not necessarily eligible for accelerated depreciation, will not be addressed any further here because it is axiomatic that for both tax and accounting purposes robots are treated as capital assets, and that tax depreciation is available for robot investment under the tax laws of most countries, which is accelerated relative to the useful life of the robot. *Id.* In some countries, such as the United States, accelerated depreciation is offered as a special tax incentive to encourage investment in capital assets, such as robots.

(3) The United States applies a hybrid income and consumption tax regime where capital is taxed elsewhere; and

(4) Tax accounting practice which claims lawful tax deductions from capital investment is "gaming" by altering the baseline.

First, substitution of robots for human workers does not yield any tax advantage. Hemel proposes a thought experiment where instead of a one-to-one trade-off of the substitution of a robot worker for a human worker, he suggests an owner could opt for a one-to-two trade-off where a firm with human workers could also make a capital investment to obtain the tax benefit afforded to capital while still employing the human workers.[82] Hemel explains as follows:

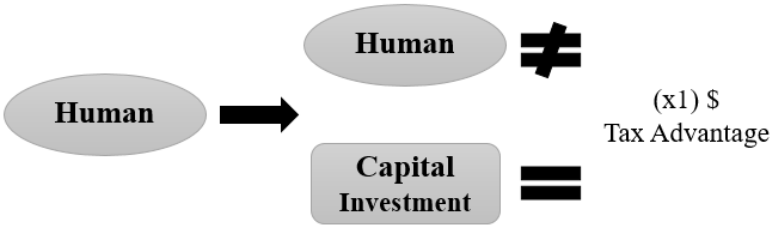
> Abbott and Bogenschneider assume that the first option is tax-favored relative to the second in a regime with capital expensing . . . This turns out to be wrong, though. If capital investments can be deducted immediately, then the firm can write off the full $69,548.82 in year one either way. Either it will invest in the robot or it will use the $69,548.82 to make another capital investment from which it will withdraw to pay wages in subsequent years.[83]

This thought experiment can be illustrated with a diagram as follows:

ABBOTT & BOGENSCHNEIDER

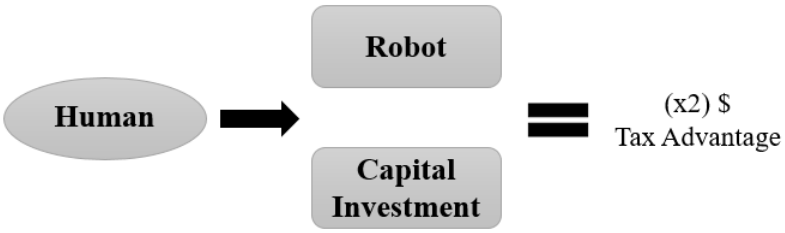
[82] *Id.*
[83] *Id.* at 232–33.

HEMEL



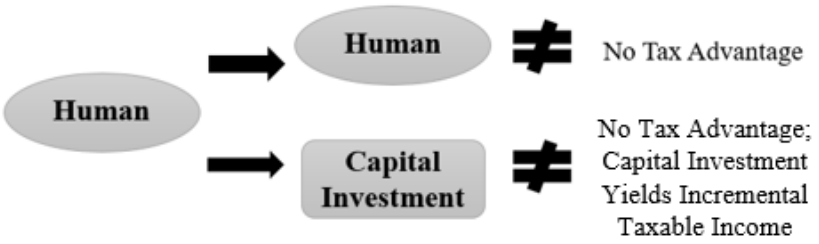
First, the simple answer to Hemel is that the second option does not yield the best available tax result. If the investment into a depreciable capital asset was an item to be used in the business, such as machinery, to be added in addition to human workers, this would yield an increased output that, for purposes of this illustration, will be assumed to be roughly double. Under baseline assumptions, a firm could achieve a superior result to the second option provided by Hemel by substituting robots for humans on the top line as follows:

DOUBLE ADVANTAGED TAX RESULT



Second, if the capital investment is not an investment to be used in the business, then it is not depreciable for tax purposes, and does not yield any tax advantage on the second line, and in addition would result in taxable income to the firm (assuming the interest coming from the capital asset was taxable), thus creating an overall negative tax result as follows:

ERROR IN OMISSION OF TAXABLE INCOME



Third, robots are comprised, in significant part, of intellectual property ("IP"). Here, Hemel suggests that robots incorporate IP developed by humans, so there is merely a trade off in wage remuneration from the production locale to Silicon Valley.[84] By robots being comprised in part of IP, he is essentially positing the U.S. tax system as levying tax on a value-added basis where each activity is taxed based on its increase in respective value, as the value creator has simply shifted from one place to another and would still be taxable. He writes:

> The bulk of the robots' value derives from the underlying intellectual property—IP that was developed, somewhere, by human engineers and other knowledge workers. Moe's Tavern is, in effect, firing its human bartenders and replacing them with another fleet of human bartenders (who may be hundreds or thousands of miles away in an office building in Silicon Valley or along Massachusetts's Route 128 corridor).[85]

However, this idea is not a reasonable assumption for the formulation of tax policy for at least two reasons. First, the United States uses an income tax system and not a hybrid value-added tax system. Significantly, this means that the firm (or its engineers) who creates the IP or software for the robots will likely not generate taxable income equal to the sale price of the robot by its value in comparison to the end consumer of the robot, even if all of the production activity is unreasonably assumed to take place in the United States. This is because both the engineering firm and the firm employing the robot in lieu of the worker will include a margin in the price that will not be taxable currently due to other tax planning activity. Second, any income related to IP embedded in robots will

[84] *Id.* at 233.
[85] *Id.* at 233–34.

be shifted offshore (even if the workers sit in the United States), to the Cayman Islands for example, via transfer pricing and structuring using intangibles. Hence, it is a reasonable working assumption that only the portion of the profits not related to the IP would potentially be taxable in the United States, even under the laughable assumptions that the engineers were working in the United States and subject to taxation as workers.

Further, the United States applies a hybrid income and consumption tax regime where capital is taxed elsewhere. Hemel suggests that corporate income is subject to double taxation where the shareholders are potentially subject to tax.[86] However, since corporations often do not choose to pay taxable dividends, the second layer of tax posited by Hemel does not apply very often. Many corporations have recently chosen to buy back stock instead of paying dividends to stockholders, which does not yield a second layer of tax if the stockholders who sell in the buy-back hold the stock in a 401(k) or for other reasons are not subject to U.S. taxation. In addition, U.S. corporations have substantial offshore profits that have typically not been taxed in the United States; thus, a first layer of tax was never applied and firms were allowed to repatriate those accumulations at a reduced rate after the Tax Cuts and Jobs Act of 2017.[87] The respective tax statistics on capital taxation generally, or more aptly, the lack thereof, have been ably summarized in an article by Soled and Thomas.[88]

Income categorized as wage income is generally not subject to reduction of the taxable base by and through transfer pricing, whereas income derived from capital, including especially income earned by large corporations, is subject to reduction by subtractions to the taxable base. Hence, the categorization of profits derived from robots as wage income means, in practical terms, that it will be subjected to tax, and its categorization as profit from capital income means that it may not be taxed at all, or at least not very much. Tax

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[86] *See id.* at 236.

[87] Tax Cuts and Jobs Act of 2017, Pub. L. 115-97, 131 Stat. 2054 § 965 (explaining the transition tax rate varies from 15.5% to 8% depending on the liquidity of the respective assets).

[88] Soled & Thomas, *supra* note 1, at 7.

avoidance by multinational firms is most often achieved by and through transfer pricing techniques where corporate taxes payable can be reduced by shifting income and expense between taxing jurisdictions, often to or near zero.[89] The potential for tax avoidance by transfer pricing is often presumed amongst tax practitioners who have some practical experience in tax avoidance planning thus rendering economic analysis that does not take into account tax avoidance potentials by transfer pricing and other methods not very helpful to tax policy design.[90]

Finally, Hemel essentially says that the use of tax accounting to lawfully claim tax deductions to reduce the tax base (i.e., to calculate taxable income) just is not fair because it changes the underlying economics by altering the baseline.[91] The first part of Hemel's claim is indeed true, but the latter is obviously not. Abbott and Bogenschneider were simply describing the tax system as it actually exists, not attempting to make an argument about optimal taxation under ideal economic assumptions.

The many economic papers, such as Hemel's, which describe an economic version of optimal taxation excluding the role of tax accounting, are not particularly helpful to tax policy formation since tax accounting is central to policy outcomes; it is hard to imagine a world without accounting toward tax avoidance even if that world were optimal.[92] The process of maximizing tax deductions is to

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[89] *See, e.g.*, Stephen Gandel, *Amazon Paid a Tax Rate of Just 1.2% Last Year, Versus 14% for Average Americans*, CBS NEWS (Feb. 6, 2020, 3:24 PM), https://www.cbsnews.com/news/amazon-taxes-1-2-percent-13-billion-2019/ [https://perma.cc/R6PW-ZZ32].

[90] *See, e.g.*, Jonathan Chew, *Corporate Giants Accused of Evading Billions in Taxes*, FORTUNE (Mar. 11, 2016, 11:00 AM), https://fortune.com/2016/03/11/apple-google-taxes-eu/ [https://perma.cc/EX4M-JB9Y].

[91] Hemel, *supra* note 18, at 221–22.

[92] Joao Guerreiro, Sergio Rebelo & Pedro Teles, *Should Robots Be Taxed?* 1 (Dynamic Econ. & Monetary Union, Working Paper No. 2017/085, 2018) ("We find that robot taxes are optimal only when there is partial automation. These taxes help increase the wages of routine workers, giving the government an additional instrument to reduce income inequality. Once there is full automation, it is not optimal to tax robots. Routine workers do not work, so taxing robots distorts production decisions without reducing income inequality."); Arndts & Kappner,

create an economic distortion to alter the baseline;[93] the creation of distortions where taxable income does not match to economic income is a significant part of practicing tax as a tax lawyer or tax accountant. The methods of tax accounting to maximize the value of tax deductions have been summarized on an analytic basis in several of the author's prior articles in the Journal of Taxation of Investments;[94] typically, the means to achieve distortion by tax planning include: (1) tax depreciation accelerated from real depreciation; (2) tax depreciation accelerated from book depreciation; (3) bunching; (4) shifting income offshore by transfer pricing; (5) claiming distortions intentionally granted by the tax code; (6) intentionally matching deductions to income; and (7) holding assets to avoid a realization or recognition event.

III. REVISED FRAMEWORK FOR INTERNATIONAL TAX

Modern economic theory favors the heavy taxation of human labor in all circumstances, even where labor is in short supply. Arnold Harberger created various analytics models of tax incidence, one of which is referred to as the "small open economy model," to support this policy preference.[95] One version of the model suggested

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supra note 39, at 1–2 ("First, by reviewing the theoretical, empirical and normative literature on input factor taxation, we conclude that the optimal capital gains tax rate is close to zero under a reasonable set of assumptions.").

[93] Bottone, *supra* note 26, at 10. ("Traditionally, the optimal taxation of productive inputs depends upon the institutional capacity to offset theoretical criteria usually employed to evaluate a tax design: neutrality, efficiency and equity. But, actually, it also depends upon policy goals. As far as capital and labour are concerned, they are always taxed differently: the infringement of the principle of neutrality is justified mostly by the need to foster productive investments.").

[94] Bret N. Bogenschneider & Benjamin Walker, *A Revised ETR Measure for Capital Re-Investment by Profitable Firms*, 37 J. TAX'N INV. 33 (2020) [hereinafter Bogenschneider & Walker]; Bret N. Bogenschneider, *The Tax Paradox of Capital Investment*, 33 J. TAX'N INV. 59 (2015) [hereinafter Bogenschneider, *Paradox*].

[95] Arnold C. Harberger, *Taxation, Resource Allocation and Welfare in* 1964 THE ROLE OF DIRECT AND INDIRECT TAXES IN THE FEDERAL RESERVE SYSTEM 25, 42, http://www.nber.org/chapters/c1873.pdf [https://perma.cc/C87J-PFUG] [hereinafter Harberger, *Taxation*]; *see* Arnold C. Harberger, *Efficiency Effects of*

that labor should be taxed as it represents the less mobile factor of production.[96] Harberger's analytic models are problematic to tax policy because they are insufficient to establish that in all cases it makes sense to reduce supply of either factor of production by taxation. The insufficiencies are especially obvious where one factor of production is targeted for taxation, namely labor, but was already in short supply in a respective economy, such as in Japan, South Korea, Germany, or Switzerland, notably representing many of the countries most interested in robot tax policy.[97]

Various economic scholars have criticized robot tax policy on the grounds of what is referred to as international tax competition based on Harberger's modeling as described in the prior paragraph.[98] The basic idea is taken from "tax incidence" analysis and states that if any nation sets a robot tax, as South Korea has already done, this

Taxes on Income from Capital, *in* EFFECTS OF CORPORATION INCOME TAX, 107, 114–17 (1966).

[96] Harberger, *Taxation*, *supra* note 51.

[97] Clausing, *supra* note 9, at 438–45 (expressing how large corporations behave as if they bear the incidence of taxation); Harberger, *Taxation*, *supra* note 51 (discussing Harberger's competing models of tax incidence are analytic models, reflecting deductive reasoning, but a choice between these models reflects inductive reasoning.) Inductive reasoning here implies non-epistemological methods at least not as traditional scientists understand that term. *Id.* Inductive choices are not epistemological for several reasons; here, because it is not known why economists seem to prefer Harberger's small open economy model. *Id.* Notably, the inductive choices of models might also be ideologically driven, but not necessarily so, since given the lack of epistemology we are not really able to explain why economists prefer to select models that suggest all tax incidence is borne by labor. *Id.*

[98] Atkinson, *supra* note 2, at 9 ("But as the Economic Policy Institute pointed out, this conclusion is based on a fundamentally flawed methodology. The reality is few if any organizations spend more on robots than they save in labor costs (unless they are using robots to boost quality). And those labor savings costs are not buried, but rather are spent—and that spending creates jobs. As Autor wrote: Automation does indeed substitute for labor—as it is typically intended to do. However, automation also complements labor, raises output in ways that lead to a higher demand for labor, and interacts with adjustments in labor supply. Even expert commentators tend to overstate the machine substitution for human labor and ignore the strong complementarities between automation and labor that increase productivity, raise earnings and augment demand for labor.").

will spark a migration of robots out of that country given the disincentive effects of taxation of a mobile factor of production. Within the theory, only capital is taken as mobile, and labor is taken as not mobile, so economists propose that taxes should be levied on labor as the immobile factor of production. Some economists go further and say the outward migration of capital would be so large that it might even reduce the tax base creating a deadweight loss from capital taxation.[99]

Robots are seen as a type of capital or equivalent to capital. Hence, under the standard economic theory described above, multinational firms might be expected to prefer to minimize taxes levied on capital including robots and migrate into jurisdictions with low taxes on robots. Atkinson explained as follows:

> There is another reason for a nation using the tax code to encourage investment: increased global competitiveness. In a relatively closed economy with little mobile capital, a highly effective corporate tax rate can have the effect of reducing overall investment but do little to affect the location of investment between nations. This situation essentially describes the U.S. economy until the late 1970s. But since then, competition for internationally mobile investment has significantly increased, spurred by reduced trade and capital barriers as well as technological innovations that enable global supply chains (e.g., shipping containers, software to manage logistics, etc.).[100]

The tax policy mandates derived from Harberger's analytics and incorporated into modern economic theory are, at the very least, surprising.[101] The baseline rule of assigning the tax base entirely to

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[99] *See* Feldstein, *supra* note 41.

[100] Atkinson, *supra* note 2, at 17.

[101] *See* Harberger, *Taxation*, *supra* note 95. It is also surprising that the same tax policy rule would apply for countries in different factual circumstances, even for countries in very different economic circumstances, such as in respect to labor supply or the availability of raw materials, such as say Finland and Mexico, or Brazil and Japan. The United States appears to be a large, open, economy and not a "small open economy," or even a "large closed economy," and thus, does not correspond to the analytic frameworks that Harberger proposed. In fact, Harberger did not provide an analytic framework for a large open economy, such as the United States. China might be seen as a possible candidate for application of Harberger's "large closed economy" analytics. Yet, no attempts appear to have been made thus far by economic theorists to apply Harberger's "large closed

labor applies in large countries with large, open economies and ready access to skilled and unskilled labor, such as the United States, and also to relatively smaller countries with less ready access to unskilled labor, such as Finland or even Austria, for example.[102] Furthermore, once placed in service, robot workers would seem to comprise possibly a fourth factor of production, as it appears distinguishable from the other factors of labor, capital, and land. Robots also appear to be, at least in some cases, less mobile than human workers, so relative mobility would suggest that robot workers representing a fourth factor of production should then be taxed under at least one if not all of Harberger's competing models of tax incidence.

Joachim Englisch set out the issue as a matter of economic theory in Conference Proceedings at Luxembourg University, where he wrote: "[h]owever, [accounting practice] . . . contradicts textbook economic theory according to which only a comprehensive cash-flow taxation is fully neutral with respect to investment projects. Where tax accounting requires asset capitalisation and pro-rata depreciation, it distorts marginal investment decisions."[103] But, the methods of accounting do exist in the actual world. So, as Englisch correctly says, the process of tax accounting "distorts marginal investment decisions" from the non-existent economic theory of comprehensive cash-flows analyses.[104] The "distortion of income," as Englisch describes, is not sufficiently reflected within

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economy" model to tax policy in China, which would otherwise suggest the taxation of capital, as opposed to labor, might be efficient at least in that context. Also surprising is that a nominally "small open economy," such as Switzerland, has by its methods of direct democracy essentially reversed economic thinking on tax policy by levying relatively low taxes on wages, and flat rate taxes on wealth, but currently enjoys arguably the highest standard of living in the world.

[102] *Id.*

[103] *Englisch, supra note 4, at 11.*

[104] *Id*. For a market failure analysis of robot taxation see Ooi & Goh, *supra* note 15, at 1–2 ("Thus, an 'automation tax' is required to correct this market failure. The aims of an automation tax are two-pronged: first, to slow the introduction of automation technology in industries which would otherwise suffer rapid and massive unemployment otherwise, so as to provide as much time as possible for governments, welfare systems, and workers to prepare for the impending effects of structural unemployment; second, to impose a tax on companies that automate so as to generate revenue for the support and re-skilling of displaced workers.").

economy theory, which is instead focused on the rate of return on marginal capital investment. Since accounting exists in the world, there is a need to take its distorting effects into account in formulating tax policy.

A. *Tax Deductions for Capital Reinvestment*

Tax investment appears to flow into higher tax jurisdictions and not away from higher tax jurisdictions in nearly all cases. The foremost question for international tax policy is *why* this happens. Tax deductions including depreciation arising from capital investment, such as investments in robots or other forms of automation, are worth more in high tax jurisdictions, at least to those firms already turning a profit in high tax jurisdictions. That caveat holds for profitable multinational firms much of the time. In comparison, tax deductions for capital investment are worth nothing in tax havens, such as those tax havens in the Caribbean where the tax rate is set at zero percent (0%).[105] Accordingly, it is unlikely that any profitable firm would choose to set up robots or other automated factories in a tax haven and there is little evidence that any have chosen to do so. That conclusion follows because as a matter of tax accounting it is necessary to calculate a tax base and not merely to compare statutory tax rates in order to calculate an amount of tax payable.

The requisite calculation of a tax base is a type of tax practitioner knowledge where the tax base is often referred to in tax parlance as "taxable income," meaning income after subtractions that are creatures of the tax code. The accounting creatures that are created do not necessarily match to real economic values. In the real economy, the incentive effects of tax deductions to capital re-investment within income tax systems are of crucial significance. By applying such practical accounting and legal knowledge of tax methods, it can be explained why most economic growth occurs in high tax jurisdictions, such as California, New York, London,

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[105] *See generally* Koffie Ben Nassar, *Corporate Income Tax Competition in the Caribbean* 6 (Int'l Monetary Fund, Working Paper WP/08/77, 2008) (referencing the Caribbean tax rates set at zero).

Beijing, Frankfurt, New Delhi, and so on. Economic growth does not seem to occur disproportionately in the many tax havens within and around the Caribbean or Mediterranean Seas, where the standard of living is often stagnant notwithstanding the respective tax rates set at or near zero.[106] There is also strong anecdotal evidence that capitalism functions poorly in countries with insidious corruption, exactly because it defeats the built-in incentive of business owners to re-invest profits back into profitable businesses.[107]

In practical terms, the ability to use deductions to reduce the taxable base means that taxes are not the deciding factor in investment decisions and explains why businesses often choose to invest in high-tax jurisdictions. This concept was previously developed with the following illustration:

> Active Investment: "Active Investor" invests $100,000 in a dry cleaning business, which he owns and operates in New York City (a high-tax jurisdiction). In the first year, the store generates $55,000 in revenue of which $5,000 is profit for book and tax purposes. [Active Investor] thus pays tax on $5,000, although he received cash proceeds of over $50,000. [Active Investor] automatically received tax deductions on capital outlays for one-half of the investment in the first year. If the store does well, [Active Investor] may open a second dry-cleaning business in the subsequent year, which will generate additional depreciation deductions for tax purposes. This will further reduce [Active Investor]'s "taxable income" in the subsequent years. Accordingly, the high tax rate is not the decisive factor in the decision whether to open the dry-cleaning business in New York City. To the contrary, the store owner is concerned almost exclusively with whether the store will constitute a good and profitable business.[108]

Practicing tax accountants and lawyers may apply a theory of taxation that differs from what economists have proposed. In tax practice, the value of tax deductions is carefully considered in tax planning activity, in addition to the maximization of the marginal return on investment, which is foremost in economic theory. The difference between tax practice and economic theory appears to broadly explain the human preference for income tax systems in

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[106] *Id.*
[107] *Id.*
[108] Bogenschneider, *Paradox*, *supra* note 94, at 61.

comparison to other tax types. Therefore, there is now an explanation of the *why* as promised above. The concepts were explained by Bogenschneider in the tax technical literature as well:

> Prior measures of Effective Tax Rates (ETR) were largely premised on the idea that taxes reduce the economic return on capital investment . . . taxes may reduce a future economic return. However, this approach is not realistic in all cases. For example, a multinational firm might also decide to re-invest profits into a jurisdiction where it is already profitable and where that capital investment yields a present tax deduction (or alternatively, a series of tax deductions into the future) that has a present value. Under such conditions (i.e., current profitability and current income taxation), a firm might decide to undertake capital re-investment to obtain a tax deduction using available surplus cash. And this type of tax-motivated investment may have the effect of reducing current income taxation as a matter of both book and tax accounting, currently and for future periods.[109]

At least one iteration of Harberger's tax incidence "models" predicts that capital investment should migrate into tax havens.[110] However, such a migration rarely, or never, actually happens in real life. Practically, this model is not very helpful due to the lack of predictive force. The inductive choice of a "model" where Harberger's analysis suggests that capital should be expected to migrate into tax havens in search of low tax rates appears to be categorically mistaken.[111] Furthermore, it can be said that the inductive feelings by which economists have selected that particular version of Harberger's "model" were wrong, and those inductive feelings will need to be updated. Since business profits are netted against expenses including depreciation on capital assets, mobile capital remains largely within high-tax jurisdictions. This netting process creates a value for tax deductions arising from capital reinvestment into ongoing business pursuits as a means of tax planning. Thus, the income tax system creates a strong and automatic incentive for profitable businesses to reinvest profits back into the economy. Although ergodic shifts in taxpayer preferences are entirely possible in the future due to technological change or other factors, there is every reason to believe that advanced and

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[109] Bogenschneider & Walker, *supra* note 94, at 34.
[110] Bogenschneider, *Paradox*, *supra* note 94, at 61.
[111] *Id.*

well-informed AIs would prefer that policymakers act in the mutual interest in setting tax policy based on the available evidence.

From this revised version of international taxation, it is possible then to begin to formulate possible AI preferences under various tax policy scenarios. An advanced AI is likely to prefer a tax system which maintains its ability to obtain tax deductions for incremental capital investment. Such is illustrated in the following summary table:

Summary Table of Robot Tax Proposals with Base AI Preference

	Type	**AI**	**Avoidability**
1.	Automation Tax similar to UI	X	Disfavored, lacks income tax incentives
2.	Imputation of Hypothetical Salary	X	Disfavored, eliminates deferral to robots
3.	Disallowance of Tax Deductions	X	Disfavored, cancels income tax incentives
4.	VAT on Robot Activities	X	Disfavored, lacks income tax incentives
5.	Levy of Pigouvian Taxes	✓	Favored, however administratively unworkable
6.	Grant of Offsetting Tax Preferences	✓	Favored, only if shifts revenue base to borrowing
7.	Corporate Self-Employment Tax	X	Disfavored, eliminates special treatment of robots
8.	Negative Depreciation on Robots	X	Disfavored, discriminates against robots
9.	Automation Fee	X	Disfavored, lacks income tax incentives
10.	Tradeable Permits	✓	Favored, creates artificial incentive framework
11.	Increase in Corporate Tax Rate	✓	Favored, incentives capital reinvestment

B. *Likely AI Preference for Income Taxation at High Rates*

By applying a baseline approach based on accounting methods with an incentive value assigned to tax deductions, it seems reasonable to believe that advanced AIs should be expected to voluntarily agree to remit taxes, just as most humans voluntarily agree to remit taxes under the tax system as it is designed today. And, the argument is not merely that if humans create robots in our own image, then robots should be expected to adopt the preferences or social norms of their creators. Rather, the idea here is a tax technical assertion that income tax systems are inherently more efficient than other tax types because of the calculation of a tax base which may be reduced by capital reinvestment. Advanced AIs will be able to formally prove to themselves, or perhaps their masters, depending on how one views the future evolution of AIs, the importance of tax accounting to economic results; and therefore, advanced AIs will conclude by tax "actualing" that income tax systems are inherently efficient and set out to levy income taxes at high rates since that design encourages capital reinvestment by profitable firms.

If AIs are equally smart, or perhaps ultimately even smarter than humans, it seems reasonable to think that such an advanced intelligence may find a means to avoid taxes, just as smart humans are now often able to find ways around taxes. Since the tax system is currently designed to heavily tax labor as opposed to capital, it is at least possible that advanced intelligences might design the tax system to favor human labor over capital if human labor became in greater demand in a world comprised partly of advanced AIs. There is then the question of whether advanced AIs might define human workers as merely equivalent to a type of robot suitable to some specific types of projects, including manual labor of various sorts, such as plumbing.[112] Perhaps the presumptions of prior research that

[112] Estlund, *Automation*, *supra* note 1, at 313 ("The problem, as economists across the political spectrum agree, is that wage hikes of that magnitude are very likely to destroy jobs and displace workers. Those wage-destructive tendencies are magnified as robots and algorithms become ever-better and cheaper substitutes for human workers, especially in the routine tasks that dominate many low-wage jobs."); Erdoğdu & Karaca, *supra* note 42, at 118 ("Nevertheless, it is expected

the so-called "routine" work will be replaced by automation is erroneous, and AIs will find that they are best suited to tasks such as capital management and stock trading—perhaps "non-routine" jobs are most at risk of automation.[113] The question may be not what jobs humans currently think are important and should be rewarded with high pay, but what jobs humans might be able to do that advanced AIs would find difficult or undesirable to do.

Tax policy premised on ideology will be significantly undermined once an advanced AI develops the ability to engage in what might be described as: tax actualing, a corollary of "deep learning."[114] The term refers to predicting economic behaviors based on actual data and cash flows in the economy.[115] Tax actualing is to be contrasted with economic modeling which is the notoriously inaccurate method of predicting matters in taxation. In the near future, as the availability of data increases exponentially,[116] it seems

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that demand for specific groups of professions will decrease rapidly as a result of advances in AI and robotics.").

[113] *See generally* Dana Darja Øye, The Robots are Already Here: An Empirical Assessment of Automation and Changes in the Occupational Composition of the Norwegian Labour Market 5 (May 2018) (M.Ec. thesis, University of Oslo) (on file with the University of Oslo) ("These studies show growing employment in professional, managerial and personal service occupations, and declining employment in manufacturing and other routine jobs.").

[114] Sampath, *supra* note 21, at 11 ("Deep learning from large data sets—ranging from Instagram images, emails, voice recordings, online posts and so on—have made possible the creation of recent image and voice recognition software, while other forms of AI applications employed for decision-making in education, employment, insurance and health care, are often a combination of Baysian hypothesis and deep learning methods.").

[115] Ooi & Goh, *supra* note 15, at 3 ("Algorithms have become dramatically better at identifying patterns and making judgments due to the greater availability of the data used as raw material for these algorithms, as well as an increase in processing power that has made it possible to process and interpret the vast quantity of available data. Algorithms are used in artificial intelligence programmes, which, due to their inherent speed, reliability, and scalability, now possess an advantage over humans in areas such as securities trading.") (citations omitted).

[116] Sampath, *supra* note 21, at 11 ("While data is in fact nonexcludable and non-exhaustive, there is little basis to use the classical economic argument that a property right on data is required to enable its production because data is being

reasonable to think that advanced AI will have the ability to track actual cash flows through the actual economy, where the economy is comprised of many billions of persons and other economic actors, including entities such as corporations or other legal entities. Available data will then be supplemented with some external causal hypotheses to thereby predict with precision what the economic outcome will be from a tax levy or tax proposal.[117] Any prediction by an advanced AI will be based on how those billions of actors are expected to behave in response to the new tax policy based on data such as savings rates and spending behaviors reflecting a partly scientific and partly "deep learning" method.[118] Thus far, the ability of AI to understand and predict human behavior based on online posts has proven problematic,[119] but in the tax context at least, the potential for AI to soon reach useful conclusions seems imminent. An advanced AI with sufficient knowledge of economic variables should soon be able to predict how all of the dollars and cents would

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generated both actively and passively by users, in quantities that are increasing exponentially each day based solely on the numbers of people who use such products/services.").

[117] *See generally* Ene, *supra* note 15, at 51 ("The list continues, with algorithms that can help machines interpret and apply coherently this bottomless resource of data, aiming to create autonomous metallic entities that can do everything humans can do, but better. If one wishes to compete with such serious opponents, it would have to resort to technologically infused human enhancements, or capitulate.").

[118] *See* KARL POPPER, THE LOGIC OF SCIENTIFIC DISCOVERY 1, 90 (2nd ed. 2002) ("[T]he theoretician must long before [experimentation] have done his work, or at least what is the most important part of his work: he must have formulated his question as sharply as possible. Thus it is he who shows the experimenter the way. But even the experimenter is not in the main engaged in making exact observations; his work, too, is largely of a theoretical kind. Theory dominates the experimental work from its initial planning up to the finishing touches in the laboratory.").

[119] Sampath, *supra* note 21, at 12 ("Or AI, while being good at execution and meeting targets, is limited in its ability to consider consequences and factor them into decision making. These shortcomings explain the accidental failures arising from AI applications which prioritize targets over potential consequences. For instance, in the area of energy, AI applications programed to optimize energy use have been found to simply cut off energy access to parts of the grid in situations of overload.").

accrue to all the economic actors in the actual economy.[120] Peter Bloom describes this possible phenomenon as a part of what is referred to as "Industry 4.0[, which] . . . focus[es] on the ability to mine explicit and implicit human data to allow machines to derive real time and long term 'smart' decision making."[121]

Notably, any discussion of what an advanced AI could do with respect to tax policy might only be thought of as reflecting the normative views of the author; this critique is something like a Rortyan mirror critique of epistemology generally,[122] where any

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[120] In comparison, econometric modeling has applied concepts such as "Deadweight Loss" to predict taxpayer behavior in broad statistical terms, however none of the predictions derived from these methods have really ever turned out to be accurate or replicable. *See* Richard G. Anderson & William G. Dewald, *Replication and Scientific Standards in Applied Economics A Decade After the Journal of Money, Credit and Banking Project*, 76 FED. RSRV. BANK OF ST. LOUIS REV. 79, 81 (1994). The inability to predict the results of a respective change in tax policy using economic theory leaves a wide latitude for one-armed economists as President Harry Truman once said, moral philosophers of all persuasions and beliefs, institutional think tanks, internet charlatans and other laypersons, politicians, and others, to render tax policy recommendations on various ideological grounds without any real idea of the likely outcome of their ideas on tax policy, just as Eisenstein said. *Compare* Maik Hettinger & Jonathan Andrew Boyd, *Taxation of robots – What Would Have Been the View of Smith and Marx on it?*, 47 INT'L J. SOC. ECON. 41 (2020) *with* David Elkins, *Consumption Taxation in Rawls' Theory of Justice*, 29 CORNELL J. LAW & PUB. POL'Y (forthcoming 2019) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3359541 [https://perma.cc/Y3FW-MF3H].

[121] Peter Bloom, *Creating Smart Economies: Administrating Empowering Futures*, *in* IDENTITY, INSTITUTIONS AND GOVERNANCE IN AN AI WORLD 131 (2020).

[122] RICHARD RORTY, PHILOSOPHY AND THE MIRROR OF NATURE (1979); *see also* Bret N. Bogenschneider, A Philosophy Toolkit for Tax Lawyers, 50 AKRON L. REV. 451, 458 (2017) [hereinafter Bogenshneider, *A Philosophy*] ("Richard Rorty['s] . . . general objection to language-as-'tool[]' . . . would be along the lines of the following: *It is actually impossible for you to give these categories of philosophy potentially relevant to taxation in anything other than language, and when you propose to use these categories as a tool, that just reflects on you*."). *But see* Jürgen Habermas, *Richard Rorty's Pragmatic Turn*, *in* RORTY AND HIS CRITICS 31, 49 (Robert Brandom, ed., 2000) ("Rorty would certainly not deny the connection between rational discourse and action. He would also agree with establishing a connection between the two perspectives: the perspective of the

purported system of knowing simply reflects back on the author, much like a mirror. In philosophical terms, the Rortyan critique rejects any epistemology of taxation apart from economics, such that all views must be considered normative—especially those which are not some derivation of economics.[123] Various economic scholars see the initial paper by Abbott and Bogenschneider daring to suggest the concept of tax neutrality, as between human and robot workers, as the epitome of such normativity.[124]

For this Article, which sets out to describe possible AI preferences on taxation, it is necessary to provide a response to the Rortyan critique in the prior paragraph. That response is as follows: since economic theory begins with the conclusion that human workers should bear as much of the tax base as possible,[125] alternative tax policy proposals are no more normative than economics itself, and some may be based on an alternative epistemology that could be even less normative than economics. The

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participants in argumentation who seek to convince each other of the correctness of their interpretations, and the perspective of acting subjects involved in their language games and practices. However, . . . he borrows from the perspective of participants in argumentation the imprisonment in dialogue that prevents us from breaking free from contexts of justification; at the same time, he borrows from the perspective of actors the mode of coping with the world.").

[123] *See* RORTY, *supra* note 122.

[124] Englisch, *supra* note 4, at 12 ("Consequently, accelerated depreciation beyond the actual use of the robot is assumed to yield tax benefits over alternative investments and factors of production, including the wage payments for the 'use' of human workers. However, they provide no empirical evidence for their claim."). To the contrary, in tax policy, analysis, and scholarship, corporate taxpayers are presumed to claim tax deductions and incentives where available; hence, evidence for tax benefits for capital investment is presented with citation to the legal and accounting requirements, which allow for tax deductions, such as I.R.C. § 162. The Internal Revenue Service occasionally publishes data on individual taxpayers not filing or claiming eligible incentives where some non-filing occurs from death or incarceration not tracked by the federal government. However, to the knowledge of the author, no illustration of corporate taxpayers not claiming available tax deductions or incentives has ever been identified, so it is unlikely that any empirical study, such as that contemplated by Englisch, would be undertaken or published if it were to be undertaken.

[125] Arndts & Kappner, *supra* note 39, at 17 ("Economists and members of the wider public advocate the taxation of human output.").

abductive reasoning of tax practitioners is a possible epistemology in the tax context, just as the scientific method is an illustration of a type of epistemology in other contexts. Abductive reasoning represents a radically different epistemology than economics when applied to tax policy (as this Article illustrates), so the methods applied within it will be necessarily different than those to which legal scholars steeped in law and economics are accustomed.

C. *Robot Tax Proceeds for Universal Basic Income*

A line of research exists within robot tax literature representing a general push toward inequality reduction by a universal basic income ("UBI") to be financed by a robot tax.[126] The problem with the discussion of a robot tax as a means to fund UBI is that it is a type of earmarking of tax proceeds.[127] In a few other contexts, social scientists have similarly proposed earmarking of the proceeds of

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[126] Bendel, *supra* note 1, at 1 ("Basic income (also 'unconditional basic income' or 'universal basic income') and robot tax are often referred to as solutions to economic and social problems. In Germany, Scandinavia, India and other countries, the idea that every inhabitant be automatically provided with basic supplies is eagerly and vigorously supported, and fought against.") (citing LOUISE HAAGH, THE CASE FOR UNIVERSAL BASIC INCOME (2018)); Sampath, *supra* note 21, at 20 ("Determining taxation of robotic production will be crucial, failing which states can find themselves in a situation of having to dole out universal basic income or other social protection benefits to individuals in the face of unemployment while large companies amass greater profits, enjoy greater efficiency and production surpluses without paying taxes on employee (robotic) revenues.").

[127] Estlund, *Ideas*, *supra* note 44, at 17 ("I believe that individuals, communities, and the society will be stronger and healthier if work (albeit perhaps less of it) is presumptively central to most people's economic livelihoods. Both by inducing some individuals to drop out of the workforce *and* by soaking up social resources that might otherwise go into job creation, a UBI is likely to contribute to long term disengagement from the paid workforce, and the attendant social alienation and anomie that would entail, for some significant share of the beneficiaries. But there is a bit more to say about the pro-work objection to the UBI."); *see* Erdoğdu & Karaca, *supra* note 42, at 118 ("A possible solution to this problem appears as levying a tax on robots to create tax revenue and address the social problems caused by extreme unemployment due to the automation. The revenue that may be generated here may also be reframed to remedy income inequality induced by robotisation.").

new tax types toward social engineering directly related to the new tax levy.[128] For example, in the context of sugar-sweetened beverage taxes, scholars proposed to use the proceeds of the sugar tax for re-education programs for consumers of sugar-sweetened beverages.[129] The consumer re-education programs plus the disincentive effects of the tax levy itself, taken together, were then posited to achieve the social policy objectives of reducing sugar consumption.[130]

Thus, in order to even begin tax policy analysis, social scientists question whether newly proposed tax levies ought to be earmarked directly to the social problem to which they most closely relate, rather than being paid into a general fund. In the specific context of robot taxation, the social problem of concern is obviously that many low-skilled or "routine" job types may be eliminated by automation,[131] resulting in widespread unemployment, particularly

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[128] *See, e.g.*, Kelly D. Brownell et al., *The Public Health and Economic Benefits of Taxing Sugar-Sweetened Beverages*, 361 N. ENG. J. MED. 1599, 1599 (2009) (proposing earmarking tax proceeds to address societal concerns of obesity and other adverse health outcomes from consuming sugar-sweetened beverages).

[129] *See, e.g.*, *id.*

[130] *Id.*

[131] OECD ECONOMIC SURVEYS: UNITED STATES: KEY RESEARCH FINDINGS 11 (Douglas Sutherland ed., 2019); *see* OECD ECONOMIC SURVEYS: UNITED STATES 2018 52 (2019) http://www.oecd.org/economy/surveys/Overview-United-States-2018-OECD.pdf [https://perma.cc/N39P-SC35] ("In a model with 'routine' workers, who are at risk of being replaced by robots, and 'non-routine' workers, who are not, a fall in the price of robots will raise tax revenue. As such, concerns about tax erosion appear misplaced."); BOTTONE, *supra* note 26, at 13 ("As far as the taxation system is concerned, the substitution of workers with robots raises the issue of a possible loss of tax revenue as labour taxes are its major source. If low-skilled or routine workers are displaced by robots and policy makers do not make investments for retraining them, then unemployment raises and tax revenue coming from labour income falls, even if robot prices reduces."). *But see* Sergio Paba & Giovanni Solinas, *In Favour of Machines (But Not Forgetting the Workers): Some Considerations on the Fourth Industrial Revolution*, *in* WORKING IN DIGITAL AND SMART ORGANIZATIONS: LEGAL, ECONOMIC AND ORGANIZATIONAL PERSPECTIVES ON THE DIGITALIZATION OF LABOUR RELATIONS 39, at 51 (Edoardo Ales et al. eds., 2018) ("Second, robots and AI can be complementary to labour ('co-bots') and can contribute to better working conditions. By replacing many repetitive and dangerous tasks, they contribute to

amongst unskilled workers.[132] Tax proceeds from robot taxation could then be earmarked to directly address the problem of structural unemployment.[133] Notably, a proverbial host of other academic scholars and paid-researchers vociferously dispute the underlying premise that such a social problem now exists, might someday exist, or that it should even be addressed by and through the tax system.[134]

However, in nearly all other prior contexts of tax policy, incentive effects of taxation are not combined with social effects of full earmarking of tax proceeds to formulate tax policy.[135] Tax policy proposals are more typically debated under the presumption that proceeds of the new tax will go into the general coffers and must be justified on that basis alone. The special earmarking for new tax

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increase the demand for more skilled workers, increasing the opportunities for re-training and professional advancement.").

[132] Guerreiro et al., *supra* note 92, at 2 ("As the cost of automation falls, the wages of non-routine workers rise while the wages of routine workers fall to make them competitive with robot use. The result is a large rise in income inequality and a substantial decline in the welfare of routine workers."); *see also* Øye, *supra* note 109, at 5 ("These authors argue that computer capital substitutes for workers in performing cognitive and manual tasks that can be accomplished by following explicit rules, and complements workers in performing non-routine problem-solving and complex communication tasks. They explain that the effect of technological progress is to replace routine labor which tends to be clerical and craft jobs in the middle of the wage distribution.") (citing David Autor, Frank Levy & Richard Murnane, *The Skill Content of Recent Technological Change: An Empirical Exploration*, 118 Q. J. OF ECON. 1279 (2003); David Autor & David Dorn, *The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market*, 103 AM. ECON. REV. 1553 (2013)).

[133] Estlund, *Ideas*, *supra* note 44, at 11 (discussing universal basic income and the perils of decentering ork).

[134] *See* D'Orlando, *supra* note 10, at 5 ("[W]hat are the economic conditions that can lead to the substitution of (almost) all workers with machines? In addition, what can we do to face the problems caused by this substitution of the workforce?"); Paba & Solinas, *supra* note 131, at 43 ("The reduction in manufacturing employment is a long-standing feature of advanced economies. In the last 15 years (2000–2015), the US lost 28.6% of employment in manufacturing, Europe (15 countries) 18.6% and Japan 14.2%. Clearly, robots and automation are only some of the factors that can explain this decline.") (citations omitted).

[135] An exception is the excise taxation of gasoline where proceeds of state taxation of gasoline are earmarked.

types would seem to be desirable only in the situations where (i) all other tax levies and expenditures were allocated in a presumptively efficient manner, or (ii) the earmarking was for a matter of public necessity, such as the repair of roads or bridges. In that latter case of necessity, the earmarking could simply substitute dollar-for-dollar for other expenditures the government is obliged to make anyway making it roughly equivalent to funds added into the general coffers. Here in the United States, the federal government spends about $6.25 on the elderly for every $1 it spends on children,[136] so there is no real danger of social programs reaching a high degree of efficiency, since money is not spent on those persons likely to generate a positive return for society in the future. A much greater return on investment could be obtained by earmarking tax receipts for child healthcare or early childhood education in comparison to UBI. Therefore, robot tax proposals should not be debated on the grounds of some special benefit resulting from earmarking the proceeds into UBI. Instead, the ongoing tax policy discourse on "robot taxation" is best thought of as primarily a matter of fiscal policy, since it represents foremost a debate over tax policy alternatives, not the desirability of UBI as social policy.

IV. CONCLUSION

Advanced AIs will inevitably have some choice in the matter of tax policy. Advanced AIs should be expected to prefer (or even to voluntarily elect into) an income tax system levied at high rates. Since higher income tax rates are strongly associated with rapid economic growth in nearly all human societies—past, present, and by all indications, future—it is likely that AIs will voluntarily choose to assess income taxes upon themselves at high rates as a means to encourage capital reinvestment. However, the concept of voluntary choice will only be true under the broad assumption that the income tax will be applied to other economic actors in a neutral

[136] URB. INST., KIDS' SHARE 2020: REPORT ON FEDERAL EXPENDITURES ON CHILDREN THROUGH 2019 AND FUTURE PROJECTIONS 3 (2020), https://www.urban.org/research/publication/kids-share-2020-report-federal-expenditures-children-through-2019-and-future-projections/view/full_report [https://perma.cc/DH6T-WEJU] (noting that $408 billion was spent on children in 2019, representing roughly 9% of Federal outlays and 1.9% of GDP).

fashion as comprising some future society, including both humans and other intelligences.

Nearly all human societies have flourished under an income tax system as opposed to other methods of taxation. The preference for the income tax system relates to the efficiency incentives of income taxation contained within it. Such a system would allow advanced AIs to achieve more economic output, even after subtracting the taxes that would be paid, just as has been the case with past human societies. And although this conclusion may seem obvious to most tax experts, such as practicing tax lawyers and accountants, it is nonetheless directly contrary to neoclassic economic theory predictions, thus many non-tax scholars may find it counterintuitive.

Humans have formulated tax policy largely by means of moral philosophy and conjecture based on economic theory, reflecting an inductive process of reasoning manifested in selecting from various economic "models" with a desirable outcome. Little or no attempt has traditionally been made to determine whether these economic models correspond to "actual." So, for example, economists do not ask if large corporations tend to make capital investments in Panama City, as their models would predict, or New York City, as experience would predict. If the economic models do not correspond to actual accounting practices, then they cannot be considered accurate predictors.

Well-informed AIs seem poised to supersede economic "modeling" of tax matters with tax "actualing" by tracking cash flows through the actual economy and measuring the resulting tax impacts. The economic effects of tax remittance by each individual person or company will be known to an advanced AI with sufficient data. In the beginning, the process of "actualing" will be further supplemented with causal modeling as it relates to tax policy; however, the end result may be an incrementally better and more efficient tax policy. AIs will, on the other hand, have the ability to make accurate predictions on economic and tax matters, and probably very soon; this advancement will constitute a tectonic shift in the design of tax policy. A sufficiently advanced and well-informed AI may soon be able to give exactly what Harry

Truman requested roughly seventy years ago:[137] a two-handed economic analysis of tax policy.

Once tax experts are able to speak with actual knowledge of the results of various tax policy proposals, Eisenstein's age of tax ideology will thereby end. Tax policy will of course still be controversial in the age of tax actualing, but it will become radically more advanced in terms of its policy recommendations. Tax actualing will allow the comparison of the costs and benefits of various tax policy proposals understood today as largely non-ideological grounds, and for the first time in human history. Of course, there will still be political ideology in that future era, but it will be markedly reduced from tax ideology as currently understood it today. For example, future tax policy debates might entail seeking out real Pareto Optimal results,[138] or perhaps analyzing trade-offs where one party was made worse off and another was made better off to some degree, and whether that trade-off was a good or bad tax policy idea. Tax actualing offers policymakers the possibility of performing that analysis in an incrementally better manner than the present day where humans sometimes proceed with moral frameworks;[139] some methods of moral philosophy (such as

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[137] Herbert Stein, *How to Introduce an Economist*, *in* ON THE THIRD HAND: HUMOR IN THE DISMAL SCIENCE, AN ANTHOLOGY 4, 5 (Caroline Postelle Clotfelter ed., 1996) ("As President Truman said, 'I wish that I had a one-armed economist, so that he wouldn't say on the one hand and on the other hand.'").

[138] *See generally* VILFREDO PARETO, MANUAL OF POLITICAL ECONOMY (1906) (examining the history of economic theory); Richard Epstein, *Taxation with Representation: Or, the Libertarian Dilemma*, 18 CAN. J. OF L. & JURIS. 7, 7 (2005) ("The first point to note is that virtually any tax system will leave just about everyone (the practical standard for Pareto superiority) better off than they are in the state of nature. Someone has to decide which of these systems is better . . . . In addition, the problem becomes more difficult because certain collective decisions have negative utility for some individuals and positive utility for others, without any opportunity to partition the two sets.").

[139] McCredie et al., *supra* note 32, at 6 ("[T]hree important normative philosophies on distributive justice, with overlapping issues of fairness, equality, desert, and rights, are considered with the aim of highlighting how each would confront the current global challenge and address inequality by redistributing income via a tax on automation. The theories discussed are utilitarianism, libertarianism, and John Rawls' theory of justice.").

assertions that only true humans are endowed with natural rights, so robots should pay the taxes)[140] would not have been out of place as epistemological methods prior to the Reformation.

As AIs gain access to data on cash flows, and thus become well-informed about the economy, it seems likely that advanced AIs will demand a type of income taxation levied at high rates to be applied on both themselves and those humans comprising some future society. Humans have reached the same conclusion by onerous trial-and-error methods. AI can optimize the efficiency of tax policy by these methods but will not be able to maximize utility absent individualized surveys of human preferences, since constraints or preference overrides on tax policy design will still be needed (e.g., human workers prefer an eight-hour work day).

However, a more immediate concern to tax policy is that rapid automation has the potential to erode the wage tax base as it is derived predominantly from the taxation of human workers, and that this erosion will not be offset by taxes paid by firms that employ robot workers.[141] The initial concern in the literature was that if robots continue to substitute for human workers, then a fiscal policy crisis may result as tax revenues decline during a period of rapid automation. That first problem arises because the tax system has been intentionally designed not to tax capital assets, such as robots, or at least not to the same degree as labor.[142] A second problem also

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[140] Arndts & Kappner, *supra* note 39, at 15 ("Humans may be endowed with natural rights; artificial intelligences are not endowed with natural rights.").

[141] McCredie et al., *supra* note 32, at 3 ("Consequently, current tax systems are under pressure, with an increasing number of displaced workers requiring transitional support, that is, vocational education and training to facilitate the acquisition of new skills, income support and safety nets. In addition, the fiscal purse, which has historically been funded by income taxes is being eroded due to a decreasing number of workers to tax, for example taxes on income and profits in OECD countries has dropped from 37.5% of total taxation revenue in 1990 to 34.1% in 2015.").

[142] *See* Mazur, *supra* note 1, at 321 ("The realization principle provides capital owners with a substantial benefit: it enables investors to indefinitely defer taxes on capital gains, thereby enabling them to considerably reduce their effective tax rates with respect to that investment, whereas income generated from labor is generally taxed immediately."). The debate in tax policy circles has thus

exists, which is that advanced AIs may soon have the ability to engage in factual structuring as a means of direct tax avoidance. This direct tax avoidance planning by advanced AIs could further erode tax receipts. Thus, the furtherance of direct tax avoidance by machines is extraordinarily problematic to the tax system both because advanced AIs might soon become better at tax structuring than accountants and lawyers, and because advanced AIs might adopt social norms toward high degrees of tax avoidance.

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proceeded to discussions of what to do about the effects of rapid automation on the tax base possibly to include the levy of an automation or robot tax. A first proposal for an automation tax was defeated in the European Parliament. As a result, South Korea then became the first nation to implement an "automation tax" with disallowances of tax incentives for robot investment, consistent with one of the proposals above. Importantly, South Korea does not appear to have suffered negative economic results therefrom, thus drawing into significant doubt the underlying economic theory referred to as "tax incidence" analysis.