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Taxing robots?

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Key message

There is a big discussion revolving around the introduction of a robot tax to cope with the following three key concerns:

1. Avoid excessive automation and protect jobs that are only automated because certain current tax systems are biased in favour of capital;
2. Secure the long-term fiscal sustainability in a scenario where automation leads to massive unemployment;
3. Achieve distributional justice when capital owners benefit disproportionately compared to workers from the diffusion of automation technologies.

Are these concerns supported by existing empirical evidence?

- No support of the presence of an adverse effect of automation technology diffusion on tax revenues.
- Total labour market effects of automation remain mixed: some jobs are very likely to disappear, while others are demanded more intensively, and new jobs emerge.
- Distribution matters: certain groups of workers are more likely to be displaced and suffer income losses, while others are more likely to benefit.
- There is no clear evidence that changes in the tax system have been a driver of excessive automation in Europe.

Takeaway

- A robot tax could be seen as a potential instrument to achieve distributional justice, albeit with various policy design aspects that remain challenging. However, policy makers should be aware that other existing social transfer mechanisms and income taxes may be better suited to achieve this.
- Better enforcement of existing capital taxation and alignment with other policies could serve as an alternative instrument to achieve the same purpose.

Why tax robots? - Three major arguments

Economists and policy makers are becoming concerned about the disruption of labour markets and other negative impacts on the economy caused by robots and other recent automation technologies now available through technological advances in artificial intelligence (AI) and computing power. To that end, robot taxation is commonly discussed as a potentially relevant policy instrument that could be implemented to help govern this process of radical technological change and mediate any expected adverse effects.

Three major arguments are put forth to support that such a tax on robots is needed:

1. **Reduce existing tax distortions favouring capital and avoid excessive automation:** Some economists argue that existing tax systems impose suboptimal high costs on labour compared to capital. This leads to *excessive* automation, meaning that automation technologies replace jobs where human labour would be cost-competitive if these distortions did not exist. This is economically inefficient, and a robot tax could be an instrument to address this.
2. **Ensure fiscal sustainability if automation erodes the tax basis:** Today, a major share of public revenues is raised on the basis of labour income. If the pessimist scenarios become true, automation technology diffusion will lead to massive job displacements and the current tax basis would be heavily eroded. Taxing robots would create an alternative source of fiscal revenue to ensure fiscal sustainability in the long term.
3. **Achieve a more equal distribution if capital owners gain more relative to workers:** Gains and losses of technological change may be very unequally distributed. Specifically, while certain jobs are at a high risk of redundancy, other jobs may be complemented, and in turn most likely associated, with higher salaries in these occupations. Further, it is argued that when automation technologies replace human labour, the owners of capital benefit. Capital ownership is unequally distributed across social groups and wealthy households typically own a larger fraction of capital assets; therefore, automation may increase inequality across these groups. It is also very likely that the effects will be highly heterogeneous across regions. A robot tax would lower the comparative advantage of those who benefit from automation and would redistribute income from the winners to the losers of automation.

Empirical support for these arguments

"*Prediction is very difficult, especially about the future*" and even more difficult when the assumption that we are just at the beginning of a period of radical technological change holds.[1] Hence, the key arguments in favour of a robot tax are mainly based on predictions of theoretical models which rely on assumptions which are unlikely to hold. About the three arguments made above, we can observe the following in terms of known empirical evidence:

1. **Existing tax distortions:** There is no empirical evidence that a tax bias in favour of capital induces suboptimal automation decisions in Europe. Research suggests that this may be the case for the US, but the results remain controversial at least for European economies where the institutions and tax systems differ largely.[2]
2. **Fiscal sustainability:** Until now, it remains unclear whether an increased diffusion of automation technologies will lead to massive unemployment overall as is sometimes predicted. Indeed, it is very likely that certain types of occupations are not here to stay forever However, various compensation mechanisms could be helpful in offsetting the negative employment effects. Historically, we have seen that all pessimistic predictions about a future with massive technological unemployment never materialized since: new jobs were created; new

1 Niels Bohr, quoted in Arthur K. Ellis, *Teaching and Learning Elementary Social Studies,* (1970), p. 431.
2 Daron Acemoglu, Andrea Manera, & Pascual Restrepo 'Does the US tax code favor automation?', *National Bureau of Economic Research* (2020); E. Mark Curtis et al., 'Capital Investment and Labor Demand: Evidence from 21st Century Tax Policy' (Mimeo, 2020).

technologies enabled the production of new goods and services; and technology-driven productivity gains released scarce resources available for other activities which induced rising income and lower prices that fuelled an economic expansion. Furthermore, governments also raise tax revenues from other sources, such as capital and sales, and there is no strong empirical evidence whether and how these would be affected. So far, there is no profound empirical evidence that fiscal sustainability would be threatened by an increasing take-off of automation.[3]

3. **Distributional fairness:** From the empirical literature, it is well documented that gains and losses of technological change are often significantly unequally distributed. It is to be expected that certain jobs will not be needed in the future, while others will be needed more and new ones will arise. Empirical research documented an increasing demand for certain ICT-related and service occupations associated with rising salaries for these jobs. Whether or not wage inequality increases at the aggregate level, remains unclear in line with evidence of certain types of low-skill service jobs benefiting through the compensation mechanisms in the labour market. Clearer is the evidence on the distribution between capital versus wage income: there is some evidence that automation is associated with a reallocation of income from labour to capital and higher profits. This leads to increasing inequality as capital ownership is unequally distributed between the poor and the rich and wealthy would benefit more. Empirical studies also suggest that it is very likely that the effects will be highly heterogeneous across regions.[4]

Summing up, a robot tax could - in principle - be a useful instrument to overcome existing tax distortions and to alleviate rising inequalities when automation technologies increasingly take off. However, the argument that such a tax is necessary to ensure fiscal sustainability in response to massive automation-driven job displacements thus far lacks any empirical justification.

Policy considerations

Practical considerations. Should policy makers decide to implement a robot tax, the following policy design aspects must be clarified:

1. Conceptual questions that remain open include: How to define robots? Why and how do robots differ from other forms of automation and capital?
2. Avoid potentially negative impacts on innovation and new technology diffusion which, in turn, may have adverse effects on long-term productivity, growth and employment.
3. If a robot tax is introduced to achieve a more balanced income distribution, robot taxes operate via two channels: Robot taxes can be seen as a direct transfer mechanism when the revenue is recycled at the benefit of the automation losers or as a market mechanism that adjusts relative factor prices.**Error! Bookmark not defined.**

Alternative policy instruments.

If a robot tax is introduced to cope with income inequality, it still needs to be shown why existing transfer mechanisms fail to achieve this. Conceptually, robots are no different from other forms of capital, and existing forms of capital income taxation are often poorly enforced. Instead, a better enforcement of existing taxation of capital income and wealth, a framework to reduce domestic and global tax avoidance, and fostering international (or EU-level) initiatives for minimum tax levels would serve the same purposes as a robot tax, potentially even less distorting.[5]Further, interactions with other large-scale political reforms must be considered. For example, carbon taxes may have a similar effect making labour cheaper compared to energy-intensive capital use. This would alleviate concerns related to economic efficiency when robot taxes undermine innovation and diffusion of productivity-enhancing technologies.[6]

3 Kerstin Hötte, Angelos Theodorakopoulos, and Pantelis Koutroumpis, 'Does automation erode governments' revenues in Europe', *Technequality Working paper* Deliverable D5.2: <https://technequality-project.eu/files/d52fdautomationandtaxationv30pdf>.
4 Jože Damijan, Sandra Damijan and Nataša Vrh, '*Tax on robots: Whether and how* much' *GROWINPRO* Working Paper 5/2021 (2021).
5 Annette Alstadsæter, Niels Johannesen, and Gabriel Zucman, 'Tax Evasion and Inequality', *American Economic Review,* 109.6, 2073-103, DOI: 10.1257/aer.20172043; Spencer Bastani, Daniel Waldenström, 'How Should Capital Be Taxed?', *Journal of Economic Surveys,* 34.4 (2020), 812-46.
6 'Environmental tax reform in Europe: implications for income distribution', *European Environmental Agency,* Technical report No. 16/2011. <https://www.eea.europa.eu/publications/environmental-tax-reform-in-europe>.