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Digital transformation: a prerequisite for high efficiency in tax systems

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Abstract: In this research we aim to investigate the importance that digitization can bring to the optimization of national tax systems, with a particular focus on how it can contribute to reducing tax evasion and avoidance and increasing the efficiency of government revenue collection

Digitization provides a necessary technical framework to achieve international coordination in the fight against tax evasion fraud. In a highly globalized economy, taxpayers can transfer very high value assets between different countries to reduce tax liabilities.

This framework for international cooperation can prove very important and is a prerequisite for achieving a fair global tax system and slows down a race to zero in setting national tax rates, ensuring better collection of tax revenues at local, regional and national levels and a fairer distribution of the tax burden between taxpayers, individuals or companies (Devereux & Vella, 2018).

Digitization brings very high value in terms of optimizing tax systems in modern societies, being able to provide pragmatic solutions for managing the complexities of today's economies and for combating tax avoidance and evasion.
Keywords: digitization, tax policy, tax administration, tax collection

JEL classification: E62, H30

1. Introduction

Informational constraints are by their very nature a central issue in the economic theory of taxation, constituting obstacles to the application of theoretically ideal taxes that could ensure both fairness in the tax system and efficiency. Somewhat utopian, governments would be ethically capable of easily supervising all tax-relevant economic aspects of individual taxpayers or companies without incurring additional costs and would thus be able to impose personalized taxes, calculated in relation to the income, earning capacity and needs of each individual. Instead, in today's economic and social reality, the government's ability to control is limited legislatively and technologically, and tax evasion and tax fraud occur with worrying frequency,

seriously affecting tax efficiency and revenue redistribution (Mirrlees, 1971). Digitization, by facilitating increased capacity to collect and process economically relevant data, offers at least the prospect of improving the transparency and accuracy of the tax system in the future.

In today's concrete economic conditions, with very high capital mobility and increasing globalization, the task for governments to exhaustively monitor the economic resources available to taxpayers is becoming more and more difficult. Instead, under the spectre of digitization, unprecedented opportunities are being created to design and implement national tax systems that are more attuned to today's economic realities. Looking at tax efficiency, it is easy to see that countries around the world could make more effective use of tax enforcement resources, including by offering the possibility to lower taxes on meticulously compliant taxpayers and, conversely, to penalize tax evaders more severely. In this way, digitization, through targeted means, can be instrumental in achieving a redistribution with high levels of revenue accuracy and in the precision and implementation of a tax system that effectively facilitates governments to raise the same revenues but practicing lower tax rates, improving equity in society and decreasing the tax burden on taxpayers (Torgler & Murphy, 2019).

By interconnecting databases of tax-relevant information and linking them with other sources of economic and sometimes social information, governments can more easily identify tax anomalies and tax avoidance behavior by individuals and companies. For example, financial institutions to take on the role of third-party reporters, providing highly accurate information on asset holdings of all kinds and capital flows. This facilitates superior taxpayer oversight and greatly reduces tax evasion and avoidance through increased transparency (OECD, 2021).

In this way, digitization can support a decisive shift from a one-size-fits-all taxation based solely on income to a much more complex taxation tailored to individual characteristics. The result can be a tax system capable of ensuring a fairer redistribution of income, using lower tax rate regimes for most taxpayers. This can reduce the tax burden on lower income earners and inevitably lead to sustainable economic growth (Alm, Bloomquist, & McKee, 2020)

2. Literature review

Ideally, public authorities should be able to monitor relevant economic information about taxpayers fully and at minimal cost. It should contain detailed data on each person's earnings, savings, expenditure and wealth. Such a described context is distortion-free and transparent would facilitate the implementation of personalized flat-rate taxes tailored to each individual taxpayer (Rabah, Jin & Lasselle, 2023).

For illustrative examples, governments could legally impose taxes in relation to specific factors such as individual earning capacity, individual needs, inheritances or even chance and luck events that impact on financial status (Delmotte, 2020). Digitization could play a central role in this paradigm, providing the absolutely essential technology for direct and automated data collection and analysis, in fact ensuring complete transparency in terms of income and wealth monitoring.

In a world in which economic information would be perfectly accurate and highly accessible, tax evasion and tax avoidance would become virtually impossible. Central and local public authorities could thus have a true picture of both the earnings and savings, as well as the consumption, of each taxpayer, whether physical or legal, reducing to zero the attempts to hide the income actually realized (Castillo, 2023).

Digitization can thus facilitate in this way a very accurate and perpetual control over time of economic transactions, making it particularly easy to detect any discrepancies, inadvertencies or irregularities. Even more than that, if markets also functioned in a theoretically ideal way (without the manifestation of negative externalities, without the existence of monopolies, with complete contracts and

undistorted informational symmetry) it would be at least theoretically possible to make the second fundamental theorem of welfare economics effectively applicable (Jacobs, 2017).

In essence, this theorem states that public authorities at any level may be able to completely separate resource allocation problems from those of income redistribution. As a consequence, every outcome that is effective from an economic perspective could be achieved through fair redistributive processes, achieved through personalized taxes and lump-sum transfers, and this is provided that it would not affect market efficiency (Agrawal et al., 2021).

Constraints related to the collection and processing of information are at the root of many problems connected with tax enforcement. The responsible public authorities do not have the capacity to comprehensively oversee all economic outcomes and, as a consequence, are therefore often forced to resort to much more costly methods and techniques in order to verify taxpayer compliance (Jacobs, 2017). At present, tax audits are widely used and penalties are applied for those who do not wish to comply.

Digitalization of the economy and the tax system can substantially improve these processes through the implementation of automated monitoring and reporting methodologies, which would implicitly lead to a significant reduction in administrative costs, but also to a relaxation of the complexity of the tax collection processes, contributing to the implementation of a tax system that is both fairer and more efficient for all taxpayers, individuals and legal entities.

Public authorities at national, regional or local level have difficulties in verifying some major aspects of the economic behavior of individuals and companies, but particularly for individuals living and working in households or on farms. By way of example, we can mention that there are no clear and effective ways to observe with certainty the income-generating abilities or to assess the effort and work put in by individuals. Thus, public authorities are forced to rely on more tangible, verifiable measures and values, such as income earned by the taxpayer, consumption, savings and wealth holdings that are as tangible as possible.

In this way, trade-offs between equity and efficiency must become unavoidable, and such informational limitations or constraints may be an essential determinant in maintaining this fragile and difficult balance (Mirrlees, 1971). Broadly speaking, the difficulty of achieving accurate and complete information collection significantly facilitates opportunities for tax avoidance and evasion, with the consequence of complicating this trade-off to an even greater extent. A summary of the problems of perfect information in taxation is summarized succinctly in Table no. 1.

Table no. 1: The economic ideal of taxation in the presence of perfect information

Theme	Relevant information	Main references
Taxation without transaction costs	In an ideal world, all income could be redistributed without distortionary taxes, thanks to perfect information about taxpayers.	Mirrlees (1971); Diamond and Mirrlees (1971); Allingham and Sandmo (1972); Kaplow (2011); Saez (2002); Devereux & Vella (2018);
Flat-rate taxes	The wide use of flat-rate taxes allows full redistribution without negative effects on the	Saez (2002); Kaplow (2011); Delmotte (2020); Ferriere et al. (2023);

	economy.	Boar & Midrigan (2022); Gerritsen et al (2024).

Source: own construction based on literature review

3. Information constraints in tax policy

First, digitization can facilitate both the collection and correlation of taxpayer information, thus facilitating a better check on the real results in the economy. It helps to identify tax evasion or avoidance more effectively. Through these mechanisms, digitization works as an advanced technology in tax law enforcement, thereby contributing to stricter and more accurate control. Through the more efficient implementation of tax laws, public authorities have the chance to raise similar revenues by collecting lower taxes (Jacobs, 2017), thus leading to efficiency gains, or they can increase tax revenues while maintaining the same tax rates.

In addition, the spread of digitization facilitates the creation or just the development of more complex and sophisticated tax systems, but at the same time also more adapted to the real situation of the extraordinary diversity of incomes and taxpayers' situations. It is thus possible to maintain lower tax rates at the same level of income redistribution, or, alternatively, to achieve more efficient redistribution, but without leading to an increase in taxes.

Including under a fully digitized fiscal infrastructure, certain economic behaviors may manifest themselves that remain difficult to monitor and control, one such example would be the effort and actual work of individuals (Hanappi, Jakubik & Ruta, 2023).

As a consequence, digitization can significantly contribute to improving the usually realized trade-off between equity and efficiency, whereas it is not even theoretically possible to annihilate it completely, mainly due to fundamental informational constraints (Hanappi, Jakubik & Ruta, 2023).

Broadly speaking, digitization can bring its contribution to significant changes in both the public and especially in the private sector, with major influences on how public authorities and taxpayers can interact and manage issues related to taxes and the tax system in general (Nikolova, 2022).

As a result of the more comprehensive adoption of digital technologies, authorities may find themselves in a position to improve the enforcement of tax laws, facilitating more accurate and efficient monitoring of transactions in the economy (Nikolova, 2022).

From another perspective, digitization is also able to contribute to cost efficiency in tax administration processes.

The technologies used under digitization simplify the inherent processes of tax data collection and management, minimizing administrative costs and increasing processing speed and accuracy of operations (Jacobs, 2017).

This can lead to lower optimal calculable tax rates as a result of governments being able to raise comparable revenues with less administrative effort (Waerzeggers, Hillier, & Aw, 2021).

Digitization in the private sector of the economy is likely to facilitate sophisticated and inventive methods of fraud and tax evasion, and this, unexpectedly, may have the consequence of increasing income and wealth inequality.

Precisely such an increase in inequality as an unintended consequence of digitization could lead to a need to correct the tax rates charged, with public authorities having to recalibrate tax levels in order to

compensate for the loss of tax revenue from taxpayers and to address equity concerns. As a result, it is not yet sufficiently clear whether achievable digitization in the private sector would be desirable to lead to increased or decreased tax rates, given the emergence of increased risks of tax fraud (Anzuini et al., 2023).

What are the advantages of digitization in defining an optimal design of the tax system?

The possible answers to this question are defining in order to fully grasp the potential that digital technology has in the effort to redesign contemporary tax systems. Our demarcation is concerned with two major directions in which digitization of the economy can benefit and contribute to:

(a) reducing tax fraud and evasion

(b) structural optimization of taxes on labor, capital, wealth and consumption. To particularize, based on the literature we synthesize some concrete policy ideas that can bring certain benefits to tax systems, these ideas revolving around two major directions of interest.

The first direction of interest refers to some ideas that concern the improvement of tax law enforcement by the authorities through the use of the most accurate possible and at the same time very detailed information on the economic situation of individual taxpayers or companies (Aslam & Coelho, 2021). In this way, digitalization can be used as a supporting technology to operationalize a more robust, efficient and highly equitable tax control.

The second direction of interest also includes some ideas that are concerned with mitigating the current trade-off that exists between equity and efficiency in the tax systems operating in the countries of the world (Jacobs, 2017). The aforementioned mitigation can be operationalized by using a much more generous amount of information at our disposal and using it to develop more tailored and fairer tax programs.

As a conclusion to the theoretical assertions, based on reasoning from the literature, we return with some broad reflections on tax policies in the context of an increasing emphasis on digitalization, highlighting in particular the ways in which public authorities could use digital technologies to respond to modern challenges revolving around the concepts of tax equity and efficiency.

There is a model that has become classic in the literature concerned with the assessment of economic constraints related to tax evasion and avoidance, proposed long ago by Allingham and Sandmo (1972). This model portrays the dilemmas faced by both taxpayers and governments through tax authorities. Under the proposed model, taxpayers (individuals or companies) are required to self-report their realized income, but they can also choose to at least partially conceal it. This is not without the risk of being discovered or identified and subject to penalties. There is also a central point in this model, namely the informational constraint: public tax authorities can only correctly or completely identify taxpayers' actual realized income if they carry out an audit, but this often involves high administrative costs. A summary of the issues of information constraints in taxation is briefly summarized in Table no. 2.

Table no. 2: Information Constraints and Impact on Tax Policy Implementation

Theme	*Relevant information*	*References*
Lack of information and tax evasion	Governments cannot audit all economic performance, leading to the possibility of tax evasion and tax	Allingham and Sandmo (1972); Zucman (2015); Alm, Bloomquist & McKee (2020); Grinberg (2012); Keen & Slemrod (2021);

	avoidance.	Torgler & Murphy (2019); OECD (2021); Rogoff (2020); Xiao & Shao (2020); Bunn, Asen & Enache (2020).
Tax audits and penalties	Economic audits are costly and depend on taxpayers' risk tolerance and the size of the penalties applied.	Gupta and Jalles (2022); Diamond and Spinnewijn (2011); Alm, Bloomquist & McKee (2020); Keen & Slemrod (2021); Torgler & Murphy (2019); OECD (2021); Slemrod (2019); Xiao & Shao (2020); Afield (2020); Evans et al. (2022).

Source: own construction based on literature review

According to Allingham and Sandmo's model, the individual decision to avoid taxation is connected to the theoretical probability that a taxpayer will be audited, but also to the stringency and size of the penalties imposed when tax fraud or evasion is identified and highlighted (Jacobs, 2017). It is therefore logical that in order to be successful in reducing tax fraud and evasion, public authorities need to identify the best possible balance between tax efficiency and audit costs, but also to keep the levels of penalties applied as optimal as possible.

It is precisely within these complex relationships that digitization is emerging. It therefore aims to change the way tax provisions are applied.

In tax enforcement theories, modern technologies mostly determine the cost of detecting tax fraud and evasion for a given amount of resources invested in auditing and monitoring activities.

4. Digitalization and efficient tax law enforcement

In order to answer this question rationally, we can refer to a particular year in which we assess the budget constraint of an individual taxpayer. The individual budget constraint involves achieving a balance between personal income and expenditure. The increase in net income and bequests or gifts received is required to be in an amount equal to net income from capital plus net income from gainful activity minus expenditure on consumption goods and bequests or gifts received. Public authorities focus on collecting information on various aspects of household budget constraint in order to ensure tax compliance (Ranchordas, & Scarcella, 2021).

In principle, in most cases, richer countries rely on systems where firms are empowered with employee wage reporting (Dom et al., 2022). This facilitates easier and more efficient monitoring of labor income. In contrast, accurately reporting self-employment income or income earned by self-employed workers is more labor-intensive, mainly due to the subjective nature of self-employment. Monitoring this income accurately is more complicated and often requires significant resources.

Similarly, it is also widespread among the countries of the world to levy taxes on capital gains, in return they require additional, more difficult checks and more accurate reporting. National financial institutions have a decisive role to play in providing the information that is needed in order for the correct taxation of capital gains (Chen & Meng, 2024).

Looking back over time, we can see definite improvements in data collection, but there are still major shortcomings. We can mention here real estate and pensions, which are subject to very low taxation in many countries, and the relevant data on these are often far from complete. In general, data on property values are collected at local authority level, and local authorities at this level are able to use recent innovative technologies, including satellite imagery, to be able to assess property taxes as accurately as possible. However, even these current technical methods are far from perfect (Belahouaoui & Attak, 2024).

At times, consumer transaction information and customs-based reporting significantly facilitate a better understanding of expenditure commitment typologies, instead they are fragmented and have limitations (Arewa, & Davenport, 2022).

With this function can come digitization, which by its technological nature has the potential to fundamentally transform the optics and methods by which tax authorities collect and verify tax information. It can also provide more detailed and accurate information on consumption levels, income earned by individuals, household assets, as well as inheritances and gifts. To exemplify, information can be collected from a wide variety of sources and then undergo a process of integration into a single system, resulting in more accurate monitoring of financial transactions (Chen & He, 2024)

In certain circumstances we can take a broader view of the notion of budget constraint, especially if we look at it in terms of consumption over the working life. One can add the net present value of total lifetime consumption (NPISH) to the net present value of the inheritances received by the individual (NPISH). This amount should be equal to the net present value of total earnings realized by the individual (NPV). Under ideal hypothetical conditions, public authorities could access data on total lifetime earnings and consumption over the whole working-life period. This would greatly facilitate the thwarting of fraud and tax evasion through inheritances and gifts (Hebous & Klemm, 2024).

5. Current technical and legal limitations and prospects for improvement through digitization

Of course, even in the case of a total digitization of the economy we cannot objectively believe in the total disappearance of tax fraud and tax evasion. However, these phenomena are likely to be drastically reduced through more accurate and operational collection and processing of taxpayers' economic data (Jacobs, 2017). If digital technologies are increasingly utilized, public authorities will find themselves able to access more accurate and detailed information on a variety of economic aspects, starting from income earned from the exploitation of assets and even including gifts received or given (Clavey et al., 2019).

The technologies associated with digitization offer a wealth of new facilities that can upgrade the efficiency of tax systems, by these methods both the administrative costs and the complexity of the processes through which taxes are collected are reduced. Following our theoretical approach, we will be concerned with the practical ways in which digitization-associated technologies can make their contribution to more robust and effective tax enforcement, thereby setting higher standards of transparency and compliance (Jacobs, 2017).

An individual's personal income includes both income from gainful activities and income from the exploitation of capital. Even from this perspective, unlike income that individuals do not report, consumption is often not actually reported directly by individuals. In this context, digitization may come into play, which through the associated technical means is able to offer an innovative solution manifested in the possibility to systematically record and analyze consumption transactions (Alm, 2021).

When there are discrepancies between the two total amounts above a certain threshold, there are suspicions that the taxpayer may be trying to avoid his or her tax liability (Martínez-Vázquez, Sanz-Arcega, & Martín, 2023). Even at present, tax authorities already use, in some circumstances, indirect proxy

measures of individuals' personal consumption estimates to intuit tax fraud and evasion, but digitization could bring noticeable improvements in this identification mechanism. If consumption transactions can be exhaustively tracked and recorded, it is possible to estimate with high fidelity the total expenditure of each individual.

Tax systems that would rely on the digitization of the economy to a large extent are useful for monitoring high net worth and high-income earners, but they can also be useful for many taxpayers with lower incomes. Of the latter, a proportion do not file tax returns on the grounds that they realize earnings below certain national thresholds for taxation and consequently benefit from tax exemptions and reliefs (Jacobs, 2017).

Moreover, if information on individual consumption were made accessible to the authorities and easy to monitor and verify, the authorities would have a leverage to control the wealth declared by the taxpayer. By linking consumption and income information to holdings of real estate or other assets, it would be possible to verify whether the growth in wealth declared by the individual is correlated with the amounts of income and expenditure actually observed (Arewa & Davenport, 2022).

If the assumption is that both consumption and income are recorded promptly and accurately in each tax year, the tax authorities have the ability to analyze possible discrepancies between the actual consumption and income from the taxpayer's gainful activities in that year. Moreover, information about holdings of wealth or other assets and individual's behavior regarding inheritances or gifts would be usable to verify whether these actions are in line with income and consumption information (Macedo et al, 2024). If, for example, a taxpayer displaces assets outside the official sector or manages to donate them to his heirs through methods that are not declared to officials, these circumvention mechanisms would be more likely and fully detectable by new technologies associated with digitization processes.

Digitization can be seen through this vision as having the potential to induce transformations in tax enforcement methods. If data on taxpayers' income, consumption and assets can be integrated and linked, the tax authorities would be in a position to significantly reduce tax fraud and evasion. This would be quite comprehensive as it applied to income tax as well as taxes on wealth, inheritances and gifts or other transfers. Technologies that include digitization would enable much higher-level transparency and more effective control, thus leading to better monitoring and assessment of real income and financial flows (Nazarov, Mikhaleva, & Chernousova, 2020).

6. The impact of digitization on taxation and tax data

Digitization, by its rigorous and exhaustive nature of record keeping, has the potential to transform even down to the level of detail the way in which the relevant public authorities monitor and collect information about assets, wealth and income from the exploitation of capital. If large and very detailed databases are willing and able to be created and linked, digitization can allow the identification of all income earned by taxpayers from a wide variety of sources such as dividends from shares, bank and non-bank interest, share and bond holdings, inheritances, and mutual and pension funds.

We've already mentioned that digitization can offer numerous advantages in the tax system, but possibly the biggest is the ability to automate data collection and analysis, thereby giving governments the opportunity to more effectively track capital revenue flows and holdings of wealth or other assets.

Generally accepted in tax theory are several obstacles to rigorous tax enforcement. One such obstacle much debated in the literature is evasion by relocating wealth or other assets to other countries of the world. A nation's taxpayers can evade or at least partially avoid income and capital gains taxes by moving their savings and investments to offshore accounts. In order to limit this method of avoidance as effectively as

possible, the world's states have begun to perfect Tax Information Exchange Agreements (OECD, 2014) whereby they usefully exchange data on the financial accounts of individuals and companies (He, 2021). The active members of these agreements are primarily the states of the Organization for Economic Cooperation and Development (OECD). They have agreed to work together effectively to mitigate tax fraud and evasion through common international databases.

The agreements reached legally allow for very detailed data exchanges on many aspects: bank and non-bank interest, dividends from stocks and bonds, permanent or occasional income from the sale of financial assets, account balances in banking and non-banking institutions (Jacobs, 2017). In this way, each individual state can track the assets of its own taxpayers even when there are attempts to have them moved to offshore accounts. The financial institutions that contribute to these data exchanges include banks and other non-bank credit institutions, securities brokerage firms, custodians, collective investment schemes such as investment funds, and insurance companies (Chaisse, 2023).

If these practices are to be extended and generalized, digitization has the potential to help establish and interconnect international registers to monitor holdings of wealth and other assets, including shares, real estate and private pension funds. Information about income from the exploitation or holding of capital, such as interest, dividends and gains from the sale of securities, could be accumulated, stored and made available to all tax authorities of the countries of the agreement, greatly thwarting international tax fraud and evasion. Pooling these registers could give a more detailed picture of the financial situation of each individual taxpayer, individual or company, and would diminish the possibilities of hiding wealth or other assets (Zucman, 2015).

Despite the obvious advantages, digitization implemented in the exchange of financial information also has some challenges. A particularly relevant challenge is the benefits of anonymous ownership, of which bearer shares or bearer bonds are the most widespread. Such financial instruments, which are quite widespread in economic practice, are not always registered in the name of the real owner, leading to difficulties in monitoring them (Jacobs, 2017).

Digitization can also help by making it easier to levy income taxes at the taxpayer's residence rather than exclusively at source. Broadly speaking, in circumstances where the tax authorities would be able to audit all the income and assets of each individual, it would no longer be necessary to apply different taxes on corporate income. Rather than taxing companies directly, governments could have the option of treating corporate income as a withholding tax on individual investors' capital taxes (Zucman, 2015).

Before being able to partially conclude on some future perspectives, we present a schematic overview of the links between lump-sum taxes and income redistribution in Table no. 3.

Table no. 3: Flat rates and redistribution of revenues

Theme	*Relevant information*	*References*
Redistribution of income based on verifiable results	Governments use information on reported income and assets to determine taxes and income redistribution.	Mirrlees (1971); Kaplow (2011); Alm, Bloomquist & McKee (2020); Devereux & Vella (2018); Keen & Slemrod (2021); OECD (2021); Torgler & Murphy (2019); Gupta & Jalles (2022);

		Larrimore, Burkhauser, Auten & Armour (2021);
Taxes on income and consumption	Because flat taxes are not viable, governments use taxes based on reported income and verifiable consumption.	Zucman (2015); Saez (2002); Alm, Bloomquist & McKee (2020); Devereux & Vella (2018); Feldstein & Wrobel (2017); Keen & Slemrod (2021); OECD (2021); Torgler & Murphy (2019); Blasco, Guillaud & Zemmour (2023); Kaplow (2011).

Source: own construction based on literature review

Digitization should not be seen in a narrow sense, just as a technological solution. Rather, it can be seen more broadly as a strategy that can offer huge potential for modernizing and streamlining tax systems globally. If it succeeds in building interconnected databases and substantially facilitates the cross-border exchange of information, digitization makes it more laborious and difficult for taxpayers to hide their income, wealth or various assets. Concomitant with these advantages it may additionally assist tax authorities to collect taxes more efficiently, reduce tax fraud and evasion, and ensure superior tax fairness (Martínez, Arzoz, & Arregui, 2022).

There are of course multiple ways and methods to fight tax fraud and evasion, one of which would be by linking information about capital income and asset holdings. Digitization can go a long way in facilitating this process by allowing tax authorities to more operatively monitor financial assets, including those held by anonymous payees (Jacobs, 2017).

In today's economic realities, where the economy is clearly becoming increasingly digitalized, consumers can even play an important role as third party reporters, especially in situations involving consumption taxation. In an economic paradigm where the majority of transactions are carried out through digital methodologies, such as card payments or online transactions, public tax authorities can use this information to make estimates of firms' total sales and effectively fight VAT or sales tax evasion.

As a consequence of all the arguments already mentioned in our theoretical approach, digitization has the capacity to bring about serious changes including in the design of tax systems, but with greater pre-gngnancy in the taxation of labor and consumption income. Mirrlees' (1971) model of optimal taxation theory, which has become a classic in the tax literature, shows how information constraints contribute to trade-offs between equity and efficiency.

Digital methodologies can also help to optimally manage these trade-offs, providing tax authorities with the tools they need to more accurately account for revenues and design and implement a fairer and more efficient tax system.

The clear way in which digitization benefits in this context is through its ability to reduce the burden of taxation by actually achieving better data collection and more information-informed analysis of taxpayers' tax behavior (Bellon et al., 2022). Digitization technologies enable governments to efficiently monitor and account for labor and capital income and to propose fairer and more efficient marginal tax rates with the aim that economic incentives are not unduly distorted by nonlinear taxation.

According to the assertions of Mirrlees' theoretical model, earning capacity and work effort are private information of the taxpayer, which the tax authorities are not able to verify directly. By considering total earned income, which is a combination of earning ability and effort expended, it becomes the only signal available to tax authorities.

Income redistribution, which is a basic principle of taxation, involves not only taxing the ability to earn income by one's own efforts, but also taxing effort, which reduces the incentives for individuals to work harder.

Particularly in emerging economies, the application of taxes on wage and other earnings is weak, and governments focus mainly on consumption taxes to collect as much revenue as possible and redistribute it later. And in these specific situations digitization could have its say, offering solutions to improve tax systems that are not linear but progressive on consumption. Digital technologies, especially those related to electronic payment and biometric taxpayer identification, allow tax authorities to more easily collect data on individuals' individual consumption and implement a fairer tax system for the broad mass of taxpayers. As a small example, a highly digitized system may encourage or even prioritize nonindividualized lump-sum taxation over consumption taxes, even in circumstances where earned income is not fully verifiable (Mpofu, 2022).

Accordingly, if there is an increasing shift towards digital collection of transaction and consumption information, tax authorities can effectively use a progressive consumption tax that manages to redistribute revenues more efficiently (Jacobs, 2017).

While the technologies associated with digitization have opened up new perspectives for the implementation of differentiated commodity taxes, the crucial question remains as to how this might influence the setting of such taxes, if it would be desirable for them to be applied. Progressive or some other non-linear form of commodity taxation starts from the assumption that authorities have access to some very detailed data on the specific demand of each individual relative to a range of goods and services (Jacobs, 2017). In the spirit of this possible reality, digitization can make a very important contribution, as it allows for the collection of detailed and highly accurate data on individual consumption, a point emphasized in other contexts. Assume transactions are carried out through electronic payment systems. Thus, public tax authorities could monitor individual and group consumption patterns much more accurately and could impose personalized progressive or other non-linear personalized taxes on various goods and services (Olbert & Spengel, 2019).

Conclusions

The conclusions drawn from this research capture a comprehensive picture of how digitization is bringing important changes to the modern tax landscape, making it easier to tune tax systems so that they can respond to the challenges in contemporary economies and find a trade-off to balance efficiency with equity. In these conclusions, we present the main results of the theoretical research, existing limitations in the literature, future directions for theoretical and empirical research, and implications for public policy.

In our approach we have highlighted the great complexity of tax systems and the transformative role of digitization in managing these complexities. In the contemporary economies of most of the world's countries, the current economic context, in which the extraordinary mobility of various forms of capital and the dynamics of national and international financial markets generate major challenges in tax collection, digitization manages to be essential to ensure highly effective oversight a correct correlation of financial information of all taxpayers (Alm, Bloomquist & McKee, 2020). An asset of digitization is its ability to process large amounts of data and thus managing to allow a constant verification of transactions carried out

and taxpayers' income, becoming a very useful tool in ensuring tax compliance and reducing fraud and evasion.

Among the high-impact benefits of digitization is the facilitation of information exchange between tax institutions, which provides the opportunity to observe much more accurately patterns of tax fraud and evasion. A much higher level of transparency and even greater consistency in tax administration can therefore be guaranteed, simply by the fact that governments can more effectively verify both the income and assets of taxpayers, thus leading to a clearer framework for tax law enforcement and facilitating the redistribution of revenue (OECD, 2021).

The results derived from this research through theoretical investigations in the literature indicate that digitization supports a more accurate application of tax legislation and allows for the optimization of the tax structure, thereby allowing for reduced costs at the levels of public administrations and simultaneously improving the efficiency of revenue collection (Devereux & Vella, 2018). To best understand the theoretical benefits of digitization, it is preferable to view them in the context of current limitations and challenges.

The processes of advanced digitization of an economy require considerable investments in infrastructure and cybersecurity to be able to honorably ensure the protection of tax data and to preserve taxpayer privacy (Feldstein & Wrobel, 2017). Therefore, access to these benefits is not unconditional, but is limited by the technological capacity of each country or government, thus potentially creating large gaps between developed countries and emerging economies, which do not always have the resources to successfully adopt and implement digital solutions of high complexity (Keen & Slemrod, 2021).

The literature reviewed in this research itself offers various suggestions for further theoretical and empirical research in the field of tax digitization. A large number of these can be of great importance in order to be able to adequately realize how digitization can be integrated into a comprehensive tax system. For example, one direction for future research should revolve around exploring the role of artificial intelligence and big data analytics (with many variables involved) in detecting and preventing tax evasion. Technologies that are becoming more advanced over time in data analytics can highlight behavioral patterns that raise suspicion and provide valuable clues about the risks of tax non-compliance. In principle, this should enable governments to put in place more effective preventive measures (Rogoff, 2020).

The implementation of digitization in national tax systems has inclusive international implications. This highlights the need for an appropriate framework for tax cooperation between more and more countries around the world. The development of the broadest possible world-wide digital tax system would enable states to collaborate effectively in the ongoing fight against cross-border tax evasion and prevent large-scale tax avoidance practices. It is thus achieved at a more optimal distribution of the tax burden between the partner states of the agreements (Torgler & Murphy, 2019). Especially by creating similar rules and regulations in the area of tax data exchange, supported by digital technologies, it can lead to desirable convergences by reducing the gaps between states and can make its relevant contribution to strengthening financial stability at the international or even global level.

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