The Economic Research Guardian – Vol. 11(2)2021
Semi-annual Online Journal, www.ecrg.ro
ISSN: 2247-8531, ISSN-L: 2247-8531
Econ Res Guard 11(2): 221-235

Does Digitalisation in Public Services Reduce Tax Evasion?

Cristina Strango
Faculty of Economics and Business Administration, West University of Timisoara, Timisoara, Romania
E-mail: cristina.strango97@e-uvt.ro

Abstract

The aim of this paper is to investigate the impact of digitalisation from public services on tax evasion. The analysis targets the European Union 27 (EU-27) member states over the period 2015-2019 by using panel estimators. The findings prove a nonlinear U-shaped relationship between digitalisation from public services and tax evasion in the former communist EU countries. More precisely, the acceleration of digitalisation in public services reduces the level of tax evasion up to a certain point. Once the acceleration reaches that point, the level of tax evasion increases once again. The impact of digitalization on tax evasion seems to be rather neutral in the non-ex-communist EU group, due to the digitalization process being very advanced.

Keywords: Tax evasion, Digitalisation, EU27, Panel estimations

JEL classification: H26, C89, C23

Received: 25 May 2021; Received in revised form: 26 July 2021; Accepted: 18 August 2021

1. Introduction

Over the last decades, the topic of digitalisation arose a special interest for both practitioners and researchers, as this process has deep implications in the socio-economic environment. Gawer and Cusumano (2002) describe digitalisation as a complex system having a configuration which includes autonomous components. All those components are dynamic ones, thereby having a huge propensity to be innovated. Tiwana et al. (2010) argue that digital platforms integrate an extended palette of information and communication technology (ICT).

The widespread implementation and integration of digital processes in the world strongly linked to innovation in high-tech area radically changed both private and public sectors. The process did not only establish a new face of 'how to do' business but also fully stimulated the trade openness and appearance of new markets. In many countries, the digitalisation process gradual covered, the public services departments as well. For example, Estonia serves as a suitable example of good practices, as digitalisation reached almost all sectors of public services. The current Estonian President in 2019, Kersti Kaljulaid, stated that "… our public sector, our government and our civil servants wanted to offer our people good quality services. We did it straight away digitally because it was simply cheaper, easy." (CNBS, 2019, page number). Moreover, the current special pandemic context gave a new valence of that process.

In this context, at the level of the European Union (EU), the process of digitalisation is still in accelerated progress in many member countries. The Digital Economy and Society Index proposed by European Commission (2020) reveals that countries such as Finland, Sweden,

Denmark and The Netherlands are the 'leaders' of the implementation of digitalisation in almost all sectors, while Italy, Romania, Greece and Bulgaria are the among the last. The same ranking order also seems to be maintained in the case of the digitalisation process of public services.

Given the importance of digitalisation of public services, the taxation field cannot be ignored as the process simplifies the administrative rules, making the partnership between taxpayers and tax authorities more transparent, clearer and honest. Such characteristics are expected to improve the tax collection by mitigating the tax evasion. Therefore, the theoretical channel between digitalisation and tax evasion is quite clear: the digitalisation process provides clear, transparent and rigours rules stimulating the tax compliance. Consequently, it is expected that the level of tax evasion will fall. In parallel, we can also expect a retrograde effect between digitalisation and tax evasion, as the process can stimulate new ways for tax evasion in a digital manner (i.e. more digitalisation, more effort to find new digital solutions to evade).

In this context and given the importance of digitalisation in EU countries, the paper analyzes the impact of digitalisation from public services on tax evasion. The target is represented by the European Union 27 (EU-27) member states over a time period from 2015 to 2019. The empirical part of this paper which supports the subsequent conclusions follows panel estimators by the GMM-system type.

The main output reveals a nonlinear relationship between digitalisation from public services and tax evasion by U-shape. In other words, the acceleration of digitalisation in public services reduces the level of tax evasion until a given point, after that it increases again. The contribution of this paper is twofold. First, to the best of our knowledge, the study is one of the first set of research projects devoted to the case of digitalisation in public services related to tax evasion in EU27, by following advanced econometrics techniques. Second, the study also offers, a nonlinear approach by highlighting the fact that there is a U-shape between the two phenomenon of digitalisation and tax evasion.

The rest of the paper is structured as follows: Section 2 presents the literature review, Section 3 reveals the data and methodology, Section 4 shows the results, while Section 5 concludes.

2. Literature review

The literature that explores the impact of digitalisation in public sectors on tax evasion is relatively scarce, although the implications of digitalisation processes on the economy was widely analysed over the last decades.

The influences of innovation on governance effectiveness via the information and communications technology (ICT) have been evidenced by different researchers (e.g., Agarwal and Dibyendu, 2019; Segismundo, 2020). For instance, the governance informational infrastructure, developed and based on ICT innovation, can increase the quality of services, offering a strong support for optimal decision-making. Moreover, this can also facilitate the interaction between government and citizens by additionally improving the public accountability and pro-activity. From this perspective, the improvement in ICT conducts to a rise in the quality of governance and control of the phenomenon of corruption. It also enhances the efficacy of the judicial system, as well as the rule of law. Moreover, the benefits of the ICT in governance are additionally potentiated by a good rule of law strengthening the advantageous.

Different studies have been conducted in the field of industrialized economies by analyzing the digitalisation as a main pillar of public sector transformation. For example, the UK public sector is targeted by Brown et al. (2017), asserting that digitalisation generates a considerable success. The authors propose a Platform Appraisal Framework (PAF) by including the different dimensions. Each of such dimensions is related to a business model by digital valence. Last, but not least, the PAF represents a huge benefit for strategy and audit of digitalisation process in GaaP action, being more accurate and providing consistent information. Taking these elements into consideration, their study demonstrated the utility of PAF for the UK government. The platform covers two different periods of time. The first period is related to 1999–2010, while the second one covers 2010 up to the present. It is noteworthy that the developed digital platforms within the unique and complex environment can revive the public area.

Other important findings have been brought into consideration by Senyo et al. (2021), who investigate the digitalisation in the public sector and its related transformation strategy. The authors empirically show that, as a component of changing strategy, an important incentive for the quality of public sector is obtained by releasing the digital platforms. Accordingly, based on a case study of Ghana's paperless port digital transformation and the technology affordance theory, they aborted the research question: "How can digital platformisation facilitate public sector transformation?" In the light of these findings and the technology affordance theory, the research develops a transformational affordance framework (TAF) and gives propositions on how digital platforms can facilitate public sector transformation.

A different perspective, regarding the Directive 2019/1151, which regulates the digital tools, is analysed by Segismundo (2020). The author reveals that the use of online procedures facilitates the process of creating and operating societies across countries. In this context, the Directive raises the information freely offered by Commercial Registers by fully enforcing the online procedures. These are related to the inclusion of societies and branches but also to the registration of their changes. Additionally, despite the involved risks, the identity, capacity and legality there are three elements of control enabled by European Union member states. Those elements assume the implication of notaries. Consequently, their physical presence is not required.

The evolution of technology will affect tax evasion in the years ahead. A big contribution invokes to directly obtain information into digital formats, in order to be easily used by computers. However, the procedures change over time due to technological progress. Therefore, the governments in the area of tax laws implementation use those procedures, but can also identify the ways followed by individuals and companies to avoid taxes. As a novelty, Alm (2021) argues that technology has the capacity to increase the economic inequality, irrespective of consequence of technology from the tax evasion perspective. The author claims that the changing technology can decompress the tax evasion for a majority of taxpayers, particularly in the case of withholding as well as third party information reporting. Another interesting aspect is that the evasion can characterise a small number of taxpayers however predominately those particularly with a very large income.

Other groups of authors emphasise the existence of methods of digital technologies for the organization of tax administration processes, with strong capacities of transformation. In this vain, Nazarov et al. (2019) argue that the incorporation of developed technologies enables one to provide administration of taxes in a real time regime. The evaluation of application of the latest technologies allows for the detection of certain factors that affect the performance of tax administration processes. Similarly, Mikhaleva and Vochozka (2020) state that the modern

technologies have a big potential to modify the quality in the tax administration, the digitalization process being primordial. The use of technologies modifies the boarding of tax authorities from conceptual perspective by facilitating analytical work. Differently, the digitalisation of government services is connected by Nimer et al. (2020) with the tax evasion. The ground is ensured by the temperance effect given by information and communication technologies (ICTs). Their study underlines several implications for leveraging ICT in public service delivery, which may support the decrease of tax evasion rising tax revenues of countries. It becomes apparent that; public authorities should improve e-government structures and e-filing systems to ease the taxpayers' income tax declarations and payments workload.

In a different sense, based on the OECD's (2017) study from corporate tax perspective, digitalisation is described as a great challenge. Herein, the profit allocation process is seen as dispersed sources of content and innovation. Regarding the VAT, the split VAT induces various treatments for digital and non-digital perspectives. Therefore, the invoicing becoming a challenging process. A remarkable aspect is that none of the findings reveal an excessive profit shifting activity in the case of digital companies.

Other important findings have been discussed by Scarcella (2020), who claims that an e-commerce sales augmentation has become notable in the past few years. In this case, the rule regarding the VAT/GST falls into a bigger risk of tax evasion as a result of proliferation of online sales. OECD (2017) has recently focused on the possible role of digitalisation in the e-commerce environment from the perspective of VAT/GST rules. The OECD proposes to develop a facility by using the e-commerce environment for the VAT/GST on sales. A connection between tax authorities and online marketplaces should also be created in order to ensure the sharing of information. Even if there is place for improvement, the role of such VAT/GST platforms represents a precious measure for authorities to protect the public revenues in the context of e-commerce business. Kitsios et al. (2020) investigate the impact of digitalisation on tax evasion, discovering that the use of digital technologies reduces the tax evasion. They also underline the role of digitalisation in developing countries as this process significantly improves the collection, processing, tracking and dissemination of tax information.

In sum, the literature regarding the impact of the digitalisation of the public sector on tax evasion is not very profound, especially in the area of the European Union. In this context, two main literature gaps can be identified: (1) there is no paper until today which investigates a potential nonlinearity between digitalisation of public sector and tax evasion, and (2) only a few of these studies in the field are devoted to investigate the EU. For these reasons, this paper is unique and necessary in its approach.

3. Data and methodology

3.1. Data

The impact of digitalisation in public services on the tax evasion is analysed in the EU-27 member states based on a panel model approach from 2015 to 2019. The selected countries are presented in Table A1, in Appendix, with the exception of Malta, due to the lack of data.

The dependent variable is the tax evasion threat as a proxy for tax evasion (teva), measuring whether the tax evasion does or does not represent a threat for the economy (i.e. 0 – tax evasion is not a threat for respective the economy, 10 – tax evasion is a significant threat for the economy). Tax evasion is a global problem today, imposing many economic costs on all societies.

Firstly, tax evasion is likely to decelerate the economic growth, strongly reducing the capacity of government to provide adequate public goods, market supporting institutions, infrastructure, human capital development or research and development (Johnson et al., 2000). Secondly, tax evasion averts resources from unproductive to productive areas of activities. For example, financial subsidiaries are often used in order to cover-up the negative effects of tax evasion (Slemrod, 2007).

The interest variable is the Digital Economy and Society Index in Public Services (digi), index, which quantifies the level of digitalisation in public services (i.e. 0 – minimum level of digitalization, 100 – maximum level of digitalization).
For testing the robustness, as well as to isolate the effect of the interest variable, a set of control variables is considered as follows: age (pop_mature), gender (pop_female), education (edu), income level (l_gdpc), size of industry (ind), religion (religion), tax burden (tax), tax system dummy (dummy_tax) and tax country dummy (dummy_excom).

Age (pop_mature) expresses the total residents aged 15-64, from the perspective of legal status or citizenship (i.e. percentage of total population). A positive connection between age and taxpayer compliance is pointed-out by Jackson and Milliron (1986). Similarly, Ritsema et al. (2003) also discovered that the younger taxpayers have a low propensity to pay taxes. Consequently the variable age is a core element for intentional evaders.
Gender (pop_female) shows the total female 15-64, from legal status or citizenship point of view (i.e. percentage of total population). Untimely research of Tittle (1980), testing the tax compliance level of males against females, shows that females are more presumptive to tax compliance. Traditionally, "females have been identified with conforming roles, moral restraints and more conservative life pattern(s)" (Jackson and Milliron, 1986, p.4).
Education (edu) is an average of many years of schooling of the adults and expected years of schooling of the children, both being expressed in years. Education attainment represents an important factor of tax evasion. Jackson and Milliron (1986) show that the capacity of taxpayers understands the matter fact that the tax environment determines them to comply or not to comply with income tax laws. The authors claim that education is characterized by two elements. The first is the general degree of fiscal acquaintance, while the second is determined by the degree of acquaintance concerning tax evasion opportunities. Research of Song and Yarbrough (1978), Wallschutzky (1984), and Witte and Woodbury (1985) discover a negative connection between the general level of taxpayers' education and tax evasion itself.
Income level (l_gdpc) reflects the Gross Domestic Product (GDP) per capita. According to Kirchler et al. (2010), the income levels have always been considered to be important determinants of tax evasion attitudes. For example, McGee (2012) finds two possible views regarding the relationship between income levels and the presence of tax evasion. The first view claims that the big-income individuals are hostile to tax evasion knowing that they are overtaxed. The second view assumes that poorer individuals have less aversion to tax evasion, as they are not able to pay taxes because of their low-income level.
Size of industry (ind) measures the industry value added as share of GDP by including the construction sector. Income source frequently represents the type or nature of the taxpayer's income (Jackson and Milliron, 1986). In this context, Schmolder's (1970) argues that when a big part of a country's labour force is employed in agriculture and a small one in trading, the income and profit taxation is unsuccessful. Further, Richardson (2006) studies the tax evaders and non-tax evaders. He discovers that people earning their income through agricultural practices, independent trades or self-employment are more prone to avoid income tax. Otherwise, the tax evasion is reduced for those taxpayers having the income dependant on wages or salaries subject to withholding (e.g. the services sector).

Religion (religion) captures the level of religious believe as a dummy variable. It is constructed based on Gallup Poll (2019), having value of 1 if more than 50% of the respective population considers religion to be an important component in their daily life, and 0 otherwise. Additionally, this variable has a powerful influence on people's attitudes, behaviour and decisions (Zimbardo and Ruch, 1979). It is expected that a high religious belief works to discourage tax evasion when taxes imposed accede to the definition of a "just tax". For example, Khalil and O'Sullivan (2017, p. 435) argue that "… any believer whether Muslim, Christian, Buddhist or other, would be inclined towards social actions regardless of his or her religion, and the reverse is true for non-believers." Doubtlessly, this affirmation could be contested, as social action does not need a religious grounding. However, some researchers claim that levels of religiosity could at least partly define the ethical comportment of some adherents (Jamali and Sidani, 2013).
Tax burden (tax) represents the tax revenue as the share of GDP. For example, Bernasconi and Zanardi (2004) argue that a negative link between tax burden and tax evasion exists, while the classical expected-utility portfolio vision of Yitzhaki (1974) reveals that the tax burden reduces tax evasion as a higher tax burden decreases the purchasing power augmenting the risk aversion.
Tax system dummy (dummy_tax) is a dummy variable, which captures the type of tax system by discriminating between flat versus progressive taxation. The economic climate dummy variable has value of 0 for the countries, which adopted the progressive tax from the period 2015-2019, and value 1 for the countries which implemented the flat tax from the same period (i.e. 1 – flat tax, 0 – progressive tax). Some studies show that progressive versus flat tax rate is the considerable structural variable in relationship with tax compliance behaviour (Clotfelter, 1983). Researchers using typical experiments discover that grand tax rates are connected to less tax compliance (Friedland et al., 1978). Clotfelter (1983) and Mason and Calvin (1984) reveal a positive connection between marginal tax rates and tax evasion while Feinstein (1991) and Christian and Gupta (1993) show a negative association between them.

Tax country dummy (dummy_excom) is also a dummy variable. This variable captures the group of non-former and former communist EU countries. The tax dummy for the value 1 denotes the former communist EU countries whereas the value 0 addresses the remaining EU countries without a communist past. They are expected to have a positive or negative impact on tax evasion (i.e. 1 – former communist EU countries, 0 – otherwise).

Detailed information about variables in term of content, scale of measurement, source of data and their expected signs are presented in Table A2, in Appendix. All explanatory variables are treated elastically. Therefore, barring the variables already expressed as indexes, percentages and dummy variables, the income level is expressed in its natural logarithm form (i.e.l_gdpc).

3.2. Methodology

The impact of digitalisation in public services on the tax evasion in the EU27 member states is analysed based on a panel model approach by Generalized Method of Moments (GMM) - system type.

This estimator reviews the issue of endogeneity, heteroscedasticity and redresses the autocorrelation in residuals by using the lagged dependent variable. The valence of GMM estimators comparing to the classical panel ones is clearly explained by Roodman (2009, p. 86): "estimators designed for situations with 'small T, large N' panels, meaning few time periods and many individuals; independent variables that are not strictly exogenous, meaning they are correlated with the past and possibly current realizations of the error; fixed effects; and heteroskedasticity and autocorrelation within individuals".

The pioneer work belongs to Arellano and Bond (1991), who present a dynamic GMM estimator (GMM-dynamic) in the following configuration:

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \sigma_1 \Delta X_{it} + \vartheta \Delta V x'_{it} + \Delta v_i + \Delta \varepsilon_{it} \quad (1)$$

α – represents the coefficient of lagged variable Y (Y- present tax evasion), whilst ϑ indicates the coefficient of the control variables Vx'. The difference-GMM approach becomes an inefficient method of estimation due to the fact that the lagged levels of regressors are weak instruments for the first-differenced variables. Therefore, Blundell and Bond (1998) proposed an improved GMM version, called system-GMM, representing a system of two equations: a differenced one and one in levels.

Hansen's J-test is used to verify the validity of instruments in robust GMM estimation, because its alternative Sargan-test seems to be inconsistent under this assumption. Additionally, the Arellano-Bond test for autocorrelation is used to recognize the autocorrelation in residuals. Here, I focus on the AR(2) test in first differences, because it identifies the autocorrelation in levels, as Mileva (2007) accentuates.

Three scenarios are developed based on GMM-system estimator: (1) EU-27, with all EU member countries; (2) EU-16, with all EU countries without the ex-communist ones; and finally (3) EU-11, with all EU ex-communist countries. These splitting sequences allow to check for robustness but additionally take into account that not all EU countries have the same historical roots concerning their political systems, which may have significant implications on the phenomenon of tax evasion. The lagged dependent variable is also considered as regressor in order to reduce the occurrence of autocorrelation arising from model misspecification.

Finally, a matrix of correlation to evidence any multicollinearity between explanatory variables have been accordingly constructed for each scenario. Moreover, scenarios EU-16 and EU-11 do not include dummy variables as they are already considered by splitting the main panel EU-27 (i.e. almost EU-11 countries practice a flat tax system, with a higher level of religious believe comparing with EU-16 group).

4. Results

The matrixes of correlations are presented in Table A3, A4 and A5 (Appendix). No multicollinearity issue between independent variables it is observed, as all coefficients of correlation are lower than the level of 0.8 indicated by Asteriou and Hall (2011).

The main estimations are presented in the Tables A6 (Appendix). As the literature suggests both positive and negative signs for *digi* in respect to *teva*, a nonlinear approach is considered by entering the square of *digi*.

UE-27 scenario in Table 6 (Appendix) shows that the interest variable $digi^2$ is significant and positively correlated with the dependent variable *teva*. This clearly validates a nonlinear relationship between digitalisation from public services and tax evasion by U-shape. The results also illustrate that only two control variables are significant in this scenario - *ind* and *dummy_excom* - both having negative signs. Herein, the expansion of the industrial sector tends to reduce the tax evasion especially in the ex-communist EU countries. This fully confirms the results of Schmolder (1970) and Richardson (2006). *Lagged teva* is also significant and negatively correlated

with the dependent variable suggesting the existence of a 'memory effect'. This suggests that the interest for digitalization declines in the future as the process expands.

Scenario UE-16 illustrates that $digi^2$ becomes not significant in respect to *teva*, registering a neutral effect. In those countries the digitalization process of public services seems to be very advanced, thus the findings being in line with European Commission (2020). Considering the control variables, only *tax* reveals a significance status, being negatively correlated with *teva*. What seems to be particularly remarkable is that the tax burden reduces the tax evasion as a higher tax burden decreases the purchasing power augmenting the risk aversion. This reinforces the contribution of Yitzhaki (1974), who argues that there is a negative link between tax burden and tax evasion via the fall of purchasing power that decreases the risk aversion to evade.

Finally, the scenario UE-11 confirms that $digi^2$ has a significant and positive sign related to *teva,* while from the control variables only *ind* and *religion* are conclusive, having a strong impact on *teva*. If the *ind* is negatively correlated with *teva*, *religion* is positively linked. Therefore, in the ex-communist EU countries, the expansion of the industrial sector is a good incentive to reduce the tax evasion. However, a higher religious belief appears to counteract that effect (i.e. if the population is more religious, tax evasion is expected to be higher). The 'memory effect' is also registered, the *lagged teva* being conclusive and negatively correlated with *teva*.

The other controls are insignificant in all three scenarios, revealing that the demographic determinants, income and type of tax system have a non-conclusive influence on tax evasion. Interestingly, the quadratic U-shape effect of *digi* to *teva* remains robust only in the scenario UE-11, while in the case of UE-16 the effect is rather neutral.

Concluding, the main output clearly evidences a quadratic link between digitalization of services from public sector and tax evasion by U-shape, the results being robust only in the former communist EU countries. The results should be considered with caution because of the lack of data regarding the EU's digitalization process (i.e. only the period 2015-2019 is officially available), and limited number of control determinants were used.

5. Conclusions

The study explores the impact of digitalisation of services from the public sector on tax evasion in the EU27 area by covering the period 2015-2019. The results are supported by dynamic panel estimators and by the GMM-system type.

The main results reveal a quadratic U-shaped connection between digitalisation of services *in the* public sector and the phenomenon of tax evasion in the former communist EU countries. More precisely, the tax evasion seems to fall under the process of digitalisation of services from public sector but only until a given level. Beyond this level, although the process of digitalization is hardily pushed forward, the tax evasion unfortunately starts to increase. The results suggests that, after a given period of time, the taxpayer tends to adapt to the new digitalized systems, having the capacity to innovate and develop other 'parallel', new ways to evade, rather similar to the digital type. Herein, the extensions of industrial sector and a less religious type of society can support digitalization to combat tax evasion.
Interestingly, in the non-ex-communist EU countries, the impact of digitalization of public services on tax evasion is rather neutral. This suggests that in those countries the digitalization of

services from public sector is very advanced, thus the tax evasion remains sensitive especially to tax burden level.

Regarding the policy implications, it is recommended for policymakers from the former communist EU countries to promote the digitalization of services of the public sector in order to control the tax evasion, but the process cannot be absolutized. The stimulation of the industry sector can support the aforementioned measures, while a strong religious believe represents a significant disincentive. The digitalization has rather a neutral influence on tax evasion in non-ex-communist EU group. Herein, the tax evasion can be generally controlled by calibrating an optimal level of tax burden.
As for further research, threshold panel estimations will be considered in order to reinforce the quadratic nonlinear U-shape connection between digitalisation of services from public sector on tax evasion in the EU27,by extending the dataset as soon as new data will be officially available.

Acknowledgment

The author thanks very much Jarko Fidrmuc for his excellent comments and suggestions helping to improve the quality of paper. Other special thanks go to Carolina Ingrid Rachel and Florian Horky for offered support in the publication process.

References

Agarwal A, Dibyendu M (2019). ICTs and Effectiveness of Governance: A Cross-Country Study, Digitalisation and Development, 321-343.

Alm J (2021). Tax evasion, technology, and inequality. Economics of Governance, January 25.

Asteriou D, Hall S (2011). *Applied econometrics*, 2nd Edition, Palgrave Macmillan.

Bernasconi M, Zanardi A (2004). Tax Evasion, Tax Rates, and Reference Dependence. *Finanzarchiv*. 60: 422-445.

Brown A, Fishenden J, Thompson M, Venters W (2017). Appraising the impact and role of platform models and Government as a Platform (GaaP) in UK Government public service reform: Towards a Platform Assessment Framework (PAF), 34(2): 167-182.

Christian C W, Gupta S (1993). New evidence on 'secondary evasion'. *Journal of the American Taxation Association*. 16: 72-93.

Clotfelter C (1983). Tax Evasion and Tax Rates: An Analysis of Individual Returns. *Review of Economics and Statistic*. 68(2): 363-373.

CNBS (2019). https://www.cnbc.com/2019/02/08/how-estonia-became-a-digital-society.html

European Comission (2020). European Comission online database.

Feinstein J S (1991). An econometric analysis of income tax evasion and its detection. *RAND Journal of Economics*. 22: 14-35.

Friedland N, Maital S, Rutenberg A (1978). A Simulation Study of Income Tax Evasion. *Journal of Public Economics*. 10: 107-116.

Gallup Poll (2019). Gallup Poll Report 2019.

Gawer A, Cusumano M (2002).Platform Leadership How Intel, Microsoft, and Cisco Drive, Industry Innovation, Hardcover April 29.

Human Development Reports (2021). Human Development Reports online database.

Jackson B, Milliron V (1986). Tax Compliance Research: Findings, Problems and Prospects, *Journal of Accounting Literature*. 5: 125-16.

Jamali D, Sidani Y (2013). Does religiosity determine affinities to CSR? *Journal of Management, Spirituality & Religion*. 10(4), 309-323.

Johnson S, Kaufmann D, McMillan J, Woodruff C (2000). Why do firms hide? Bribes and unofficial activity after communism. *Journal of Public Economics*. 76(3): 495–520.

Khalil S, O'Sullivan P (2017). Corporate Social Responsibility: Internet social and environmental reporting by banks. *Meditari Accountancy Research*. 25(3): 414-444.

Kirchler E, Muehlbacher S, Kastlunger B, Wahl I (2010). Why pay taxes? A review of tax compliance decisions. In J. Alm, J. Martinez-Vazquez, and B.Torgler (Eds.), Developing alternative frameworks for explaining tax compliance (pp. 15-31). Abingdon, Oxon, UK: Routledge.

Kitsios E, Jalles J, Verdier G (2020). Tax Evasion from Cross-Border Fraud: Does Digitalization Make a Difference? IMF Working Paper, November.

Mason R, Calvin L (1984). Public confidence and admitted tax evasion. *National Tax Journal*. 37: 489-496.

McGee R W (2012). Christian views on the ethics of tax evasion. In R. McGee (Ed.), The ethics of tax evasion (pp. 201-210). New York, NY: Springer.

Mikhaleva O L, Vochozka M (2020). Application of Information Technologies in Tax Administration, Current Achievements, Challenges and Digital Chances of Knowledge Based Economy, 273-278.

Nazarov M A, Mikhaleva O L, Chernousova K S (2019). Digital Transformation of Tax Administration, In book: Digital Age: Chances, Challenges and Future, 144-149.

Nimer K, Uyar A, Kuzey C, Shabaz M, Schneider F (2020). Can e-government initiatives alleviate tax evasion? The moderation effect of ICT, Technological Forecasting and Social Change, 166, May 2021, 120597.

OECD (2017). OECD online database-Tax Challenges of Digitalisation.

Richardson G (2006). Determinants of tax evasion: A cross-country investigation. *Journal of International Accounting, Auditing and Taxation*. 15(2): 150-169.

Ritsema C M, Thomas D W, Ferrier G D (2003). Economic and behavioral determinants of tax compliance: evidence from the 1997 Arkansas tax penalty amnesty program, IRS Research Conference, June.

Scarcella L (2020). E-commerce and effective VAT/GST enforcement: Can online platforms play a valuable role? *Computer Law & Security Review*. 36: 105371.

Schmölders G (1970). Survey research in public finance: A behavioral approach to fiscal theory. *Public Finance*. 25: 300-306.

Segismundo A (2020). Digitalization: how will it work in practice?, ERA Forum 21, 221-234, May 25.

Senyo P K, Effah J, Osabutey E L (2021). Digital platformisation as public sector transformation strategy: A case of Ghana's paperless port. *Technological Forecasting and Social Change*. 162: 120387.

Slemrod J (2007). Cheating ourselves: the economics of tax evasion. *Journal of Economic Perspectives*. 21(1): 25-48.

Song Y D, Yarbrough T E (1978). Tax Ethics and Taxpayer Attitude: A Survey, *Public Administration, Review*. 38(5): 442-452.

Tittle C (1980). *Sanctions and Social Deviance: The Question of Deterrence*, New York: Praeger.

Tiwana A, Konsynski B, Bush A (2010). Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. *Information Systems Research*. 21(4): 675-687.

Witte A, Woodbury D (1985). The Effect of Tax Laws and Tax Administration on Tax Compliance: The Case of the U.S. *Individual Income Tax, National Tax Journal*. 38(1): 1-13.

World Bank (2021). World Development Indicators online database.

World Competitiveness Yearbook (2021). World Competitiveness Yearbook online database.

Yitzhaki S (1974). A note on "Income Tax Evasion: A Theoretical Analysis". *Journal of Public Economics*. 3: 201-202.

Zimbardo P G, Ruch F (1979). *Psychology and life* (10th ed.). Glenview, IL: Scott, Foresman & Company.

Appendix

Table A1 - List of analyzed countries

Countries				
Austria	Denmark	Hungary	Netherlands	Spain
Belgium	Estonia	Ireland	Poland	Sweden
Bulgaria	Finland	Italy	Portugal	United Kingdom
Croatia	France	Latvia	Romania	
Cyprus	Germany	Lithuania	Slovak Republic	
Czech Republic	Greece	Luxembourg	Slovenia	

Table A2 - Description of variables and their expected signs

Variables	Explanation	u. m.	Source	Expected sign
Tax evasion-dependent variable (teva)	Index measures if the tax evasion is not a threat for the economy (0 –minimum level, 10 – maximum level).	Index	World Competitiveness Yearbook (2021)	
Digital Economy and Society Index in Public Services-interest variable (digi)	Index measures the level of digitalization in public services (0 – minimum level, 100 – maximum level).	Index	European Comission (2020)	+/-
Controls:				
Age (pop_mature)	Variable expresses the total residents ages 15-64, from legal status or citizenship point of view (% of total population).	%	World Development Indicators (2021)	+/-
Gender (pop_female)	Variable expresses the total female 15-64, from legal status or citizenship point of view (% of total population).	%	World Development Indicators (2021)	-
Education (edu)	Variableis an average of mean years of schooling (of adults) and expected years of schooling (of children), both expressed .	%	Human Development Reports (2021)	+/-
Income level (l_gdpc)	Variable reflects the GDP per capita.	(current US$)	World Development Indicators (2021)	+/-

Size of industry (ind)	Variable measures the industry value added (including construction) as share of GDP.	%	World Development Indicators (2021)	-
Religion (religion)	Variable captures the level of believe (1 – yes, 0 – no)	Dummy	Constructed based on Gallup Poll (2019)	-
Tax burden (tax)	Variable represents the tax revenue as share of GDP.	%	World Development Indicators (2021).	+/-
Tax system dummy (dummy_tax)	Variable captures the type of tax system (1 – flat tax, 0 – progressive tax).	Dummy	Constructed	+/-
Tax country dummy (dummy_excom)	Variable captures the group of non-former and former communist EU countries (1 – former communist EU countries, 0 – otherwise).	Dummy	Constructed	+/-

Table A3 - Matrix of correlation for EU27

Correlation	digi	pop_mature	pop_female	edu	l_gdpc	ind	Religion	tax	dummy_tax	dummy_excom
digi	1.000									
pop_mature	-0.046	1.000								
pop_female	-0.273	-0.183	1.000							
edu	0.485	-0.279	-0.170	1.000						
l_gdpc	0.328	-0.183	-0.305	0.365	1.000					
ind	0.129	0.027	-0.011	-0.076	-0.229	1.000				
religion	-0.404	0.295	0.290	-0.603	-0.302	-0.006	1.000			
tax	-0.007	-0.224	0.026	0.153	0.330	-0.486	0.065	1.000		
dummy_tax	-0.100	-0.008	-0.002	-0.232	-0.234	0.058	-0.080	-0.210	1.000	
dummy_excom	-0.319	0.102	0.229	-0.193	-0.306	0.019	0.050	-0.326	0.617	1.000

Table A4 - Matrix of correlation for EU16

Correlation	digi	pop_mature	pop_female	edu	l_gdpc	ind	religion	tax
digi	1.000							
pop_mature	0.204	1.000						
pop_female	-0.409	-0.114	1.000					
edu	0.345	-0.204	-0.252	1.000				
l_gdpc	0.114	-0.163	-0.491	0.239	1.000			
ind	0.044	0.138	0.046	-0.325	-0.672	1.000		
religion	-0.399	0.200	0.291	-0.671	-0.277	0.122	1.000	
tax	0.115	-0.262	-0.114	0.407	0.636	-0.598	-0.265	1.000

Table A5 - Matrix of correlation for EU11

Correlation	digi	pop_mature	pop_female	edu	l_gdpc	ind	religion	tax
digi	1.000							
pop_mature	-0.339	1.000						
pop_female	-0.007	-0.388	1.000					
edu	0.648	-0.408	0.071	1.000				
l_gdpc	0.419	-0.161	0.062	0.495	1.000			
ind	0.230	-0.128	-0.078	0.269	0.230	1.000		
religion	-0.425	0.457	0.279	-0.511	-0.336	-0.138	1.000	
tax	-0.335	-0.138	0.340	-0.326	-0.150	-0.434	0.446	1.000

Table A6 - GMM-system results

Dependent variable: teva	Model(UE 27)	Model (UE 16)	Model (UE 11)	Expected sign
$digi^2$	**0.089*** **(0.052)**	0.278 (0.256)	**0.091***** **(0.031)**	+/-
digi	-1.194 (0.993)	-4.911 (5.026)	**-1.114*** **(0.641)**	+/-
pop_mature	0.024 (0.134)	0.071 (0.146)	-0.228 (0.211)	+/-
pop_female	0.167 (0.602)	1.066 (1.345)	-0.455 (0.545)	-
edu	0.106 (0.093)	0.192 (0.134)	0.046 (0.068)	+/-
l_gdpc	-0.519 (0.441)	1.331 (1.969)	-0.235 (0.564)	+/-
ind	**-0.089*** (0.048)	-0.012 (0.187)	**-0.104**** (0.045)	-
tax	-0.043 (0.063)	**-0.245**** (0.124)	-0.133 (0.099)	+/-
religion	-0.027 (0.024)	-0.052 (0.033)	**0.027**** (0.013)	+/-
dummy_tax	-0.781 (0.711)			+/-
dummy_excom	**-1.336*** 0.823			+/-
lagged teva	**-0.498***** (0.136)	-0.463 (0.394)	**-0.921***** (0.209)	+/-
constant	0.879 (28.53)	-52.11 (95.07)	49.35 (33.28)	+/-
Type of estimation	GMM-system	GMM-system	GMM-system	
Number of instruments	18	12	12	
Hansen test [p-vales]	4.21 [0.521]	0.03 [0.865]	0.39 [0.531]	
Arellano-Bond p-vales test for AR(2)	0.85 [0.396]	0.88 [0.377]	-1.19 [0.235]	
Obs.	108	64	44	
Groups	27	16	11	

(a) (...) denotes the standard error, while […] is the p-vales;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.