What impacts the value of revenues from taxation of income of corporations? Evidence from European Union Member States

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Keywords

Corporate Income Tax, Fiscal Policy, Tax management, Macroeconomics

Abstract

Fiscal revenues from taxation of income of corporations are more volatile than those earned from any other mayor tax. COVID-19 and the war in Ukraine pose additional threats to government inflows from this source, especially jeopardizing several EU Member States and Eurozone countries struggling with piling public debts, but at the same time maintaining common monetary policy. Therefore, there is a need for better management of revenues from corporate income tax in periods going forward. The aim of this study is to explain the impact of the level of budget inflows from taxation of income of corporations. It turns out that countries are indeed able to influence revenues from this tax by shaping the statutory tax rates. However, most determinants cannot be influenced directly by governments – such as GDP, level of globalization, R&D expenditures, total employment, age dependency ratio, or public debt. Although some of these phenomena are out of control in the short term, states may consider affecting their levels through appropriate economic policy led in the long run. This study is performed for panel

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data encompassing 16 potential determinants of corporate income tax revenues for all EU Member States from 1995 to 2020, which is the longest period ever considered for such a set of countries that concurrently includes first aftermaths posed to the economy by COVID-19.

JEL Classification

H25, H21, K34, E62

I. Introduction

With respect to fiscal policy, there are several issues that affect the pace of GDP increase and influence the capacity to build a resilient society with acceptable income disparities. Among them could be (i) size of government inflows, (ii) government spending in general, as well as its (iii) composition and (iv) volatility of government expenses, as well as (v) stability and (vi) composition of income sources derived from different taxes. As the spending in the long run is not possible without revenues, the collection of taxes which enable execution of economic policy is vital.

National budgets of European Union Member States are primarily composed of tax inflows. On average in the period 1995 – 2020, taxes and social security contributions were responsible for between 79% (for Bulgaria) and 92% (for Belgium) of total budget revenues. The average for the whole community was 88% (own calculations based on Eurostat data). The remaining share was comprised of inflows from privatization, interest, dividends, licenses, interest, or customs duty.

Therefore, raising tax revenues is one of the key objectives of any government concerned with the budget. Some economists believe that expansionary fiscal policy may enhance economic growth [1] [2]. Long-term growth is often claimed to be supported by public investments[3]. Yet, it must be underlined that only stable tax revenues may ensure the execution of that aim. Predictable revenues that do not significantly change year-to-year enable states to lead responsible fiscal

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[1]   Aschauer, D. A. (1989). Is public expenditure productive? Journal of Monetary Economics 23.

[2]   Munnell, A. H. (1990). Why Has Productivity Growth Declined? Productivity and Public Investment. Federal Reserve Bank of Boston.

[3]   Barro, R. (1990). Government Spending in a Simple Model of Endogenous. Journal of Political Economy.

policy and smooth business cycles. At the same time, the risk of excessive government debt could be minimized.

There are also numerous studies stating that low taxes may support the development of the economy [4] [5] [6] [7] [8]. According to Mountford and Uhling[9], tax cuts – even when connected with rising budget deficit – effectively stimulate economic growth. On the other hand, Romer and Romer[10] calculated that an increase in taxation level of 1% in relation to GDP transforms into 3% output reduction in the following three years. At the same time, there are empirical studies that do not confirm the linkage between tax rates and GDP growth [11] [12].

All the previously mentioned research considers rather short-term periods. Yet, those findings indicate the importance of fiscal policy and desirable size of the government. To maintain the preferable balance of the government in the total economy, it is certainly required to assure stable inflows from taxes over time. If actions aiming at limitation of volatility are scarce or even not available, it is at least required to anticipate future inflows from taxes to accommodate future spending.

Economists acknowledge that public expenditures should be covered by government revenues in the long term. Maintaining a balance between budget spending and tax inflows contributes to economic growth [13] [14]. Certainly, such

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[4] Engen, E. M., & Skinner, J. (1992). Fiscal Policy and Economic Growth. NBER Working Paper Series, 4223.

[5] Daveri, F., & Tabellini, G. (2000). Unemployment, growth and taxation in industrial countries. Economic Policy 15.

[6] Padovano, F., & Galli, E. (2001). Tax Rates and Economic Growth in the OECD Countries. Economic Inquiry, 39(1), pp. 44-57.

[7] Lee, Y., & Gordon, R. H. (2005). Tax structure and economic growth. Journal of Public Economics, 89, pp. 1027-1043.

[8] Karras, G., & Furceri, D. (2009). Tax and growth in Europe. South-Eastern Europe Journal of Economics 2.

[9] Mountford, A., & Uhlig, H. (2008). What Are the Effects of Fiscal Policy Shocks? Working Paper no. 14551, NBER, Cambridge.

[10] Romer, C., & Romer, D. (2007). The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. NBER Working Paper n. 13264.

[11] Easterly, W., & Rebelo, S. (1993). Fiscal Policy and Economic Growth: an Empirical Investigation. NBER Working Paper Series, 4499.

[12] Mendoza, E. G., Milesi-Ferretti, G. M., & Asea, P. (1997). On the Ineffectiveness of Tax Policy in Altering Long-Run Growth: Harberger's Superneutrality Conjecture. Jpurnal of Public Economics, 66, pp. 99-126.

[13] Bassanini, A., Scarpetta, S., & Hemmings, P. (2001). Economic growth: the role of policies and institutions. Panel data evidence from OECD countries. OECD Economics Department Working Papers No. 283.

[14] Fölster, S., & Henrekson, M. (2001). Growth effects of government expenditures and taxation in rich countries. European Economic Review.

claims hold true providing that government expenditures correspond to current economic conditions and the size of the state is not excessive. As a result, identification of reliable sources of government inflows may provide a useful tool to cope with the cyclicality of an economy and support smooth GDP growth.

Unstable fiscal revenues limit the capacity of the government to conduct significant spending cuts when needed. This issue is especially vivid when tax inflows remain low for a longer time. Moreover, restraints in fiscal policy have their consequences as the real economy is affected. This in turn pushes a country into a vicious circle of periodicity [15]. Researchers claim that strict budget policy fuels the cyclicality of an economy [16]. Surprisingly, Canova and Pappa state that fiscal constraints have a rather limited impact on macroeconomic fluctuations, but they mention several reasons that could blur their results in this respect [17].

Taxes, depending on the object and subject a particular tax is imposed on, significantly diverge from the perspective of stability of inflows they provide. The set of taxes used by EU states is comparable – in particular, all systems include corporate income tax ('CIT'), personal income tax, social security contributions, and the HICP over the whole EU added tax and excise duty. Obviously, the mentioned taxes are of different importance in particular regions. The significance of sources of budget inflows typically depends on industry combination, voters' attitude, or general economic conditions [18] [19] [20]. Among this set, most unstable revenues provide CIT. Taxes on labour and on consumption are far less volatile [21]. This occurs mainly due to the construction of the tax base. As CIT is imposed on income, in the absence of profits, simply no tax is due. Therefore, as CIT revenues are especially buoyant, there is a need to concentrate on this tax to better understand reasons for its instability and use/assess this knowledge from different perspectives. It should be expected that especially now – in connection with the COVID-19 economic downturn and the war in Ukraine – tax revenues may suffer. It is likely that inflows from CIT will be affected most.

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[15] Kwak, S. (2013). Tax Base Composition and Revenue Volatility: Evidence from the U.S. States. Public Budgeting & Finance.

[16] Levinson, A. (1998). Balanced budgets and business cycles: evidence from States. National Tax Journal.

[17] Canova, F., & Pappa, E. (2005). Does it Cost to be Virtuous? The Macroeconomic Effects of Fiscal Constraints. NBER Working Paper Series.

[18] Case, A., & Besley, T. (2003). Political Institutions and Policy Choices: Evidence from the United States. Journal of Economic Literature.

[19] Garrett, T. (2006). Evaluating State Tax Revenue Variability: A Portfolio Approach. Federal Reserve Bank of St. Louis Working Paper Series.

[20] Crain, M. (2003). Volatile States: Institutions, Policy, and the Performance of American State Economies. University of Michigan Press.

[21] Karpowicz, A., Tazhbenova, G., Tulegenova, Z., & Orynbekova, G. (2020). STABILITY OF FISCAL REVENUES IN EU: WHAT TO TAX? BULLETIN OF NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN.

Therefore, there is a need to reconsider the determinants of revenues from that tax, which is the aim of this article. This issue is important and might be interesting for researchers, policymakers, and other individuals concerned with the subject.

In this research focus is laid on European Union Member States. Although keeping balanced budgets is a common objective of economies across the world, it seems key for Euro area states. They use a single currency, hence leading a common monetary policy. To improve economic stability of those countries and to provide for at least impeded policy-mix tools, certain requirements related to fiscal policy were imposed. Among them are Convergence Criteria (or Maastricht Criteria), which require that (i) the ratio of government debt to GDP should not exceed 60% and (ii) the ratio of the annual government deficit to GDP must be limited to 3% [22]. Several Member States surpass those values. The motivation to extend this research to all EU countries was that (i) eventually all of them may join the Eurozone and (ii) to enlarge the analysed sample for statistical reasons. Finally, there is a process of development of a common market across the whole EU (i.e. not restricted to Eurozone countries only). CIT law is led so far independently by any EU country (no matter whether it belongs to the Eurozone or not). The behaviour of taxes over time may play a role in the consolidation of fiscal policy of the Member States.

Public debt in practice fluctuates significantly, and in most cases is well beyond acceptable levels. Although many Member States managed to decrease their debt in the second part of the last decade, and in 2017 some of them even achieved a government surplus (which was supported by the general economic revival in those years), the average government debt for all EU countries in 2017 fell to 81.7% of the community GDP. That figure is much higher than prior to the economic crisis; in 2007, the value was at 62.3% of the GDP. In the EU-27, public debt declined further, from 79.7% at the end of 2018 to 77.5% at the end of 2019. At the same time, for Euro area countries, the figures were 86% and 83.9% for the respective years[23]. These numbers are well beyond Convergence Criteria and are again on the rise. In the EU, the government debt-to-GDP ratio increased to 89.8% at the end of 2020, the highest in the time series. Especially elevated ratios were recorded in Greece (206.3%), Italy (154.9%), Portugal (134.9%), Spain (120.4%), France (115%), Cyprus (113.5%) and Belgium (112.%) [24]. Interestingly, all those countries belong to the Euro area – a place where the pressure for low indebtedness is especially desirable.

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[22]   Protocol (No 12) on the excessive deficit procedure, *Official Journal 115 , 09/05/2008 P. 0279 - 0280*

[23]   https://ec.europa.eu/eurostat/databrowser/view/GOV_10DD_EDPT1__custom_4612172/default/table?lang=en

[24]   Ibid.

Taking into consideration the above, there is a necessity to assure sound and stable revenues for national budgets. Eventually, they may support smooth economic growth of a state. Inflows from most taxes follow the business cycle. Authorities of any state likely wish to run fiscal policy without steadily controlling their potentially volatile fiscal revenues. It is likely that any government would prefer to use a tax that provides similar revenues in any year, or at least to have a possibility to estimate the inflows. For this reason, the focus on determinants of government revenues should be laid out. As inflows from CIT are particularly volatile, there is a huge scope for development with respect to this tax. Member States may feel strong motivation to use the tools at their disposal to shape CIT revenues. Yet it might be expected that government actions are of lesser importance than those exercised by all other determinants of CIT receipts that result from market play, where the quantity of these uncontrollable factors predominates. Thus, the hypotheses of this research are as follows:

(1) Member States are able to affect the value of CIT revenues by using certain controllable determinants, but most determinants of CIT inflows are taken from the market and cannot be managed directly.

(2) Determinants that could be directly influenced by the government are of lesser importance for the value of CIT revenues than uncontrollable determinants altogether.

The study concerns EU-27 countries. Due to (i) geographical coverage and (ii) practical importance of the research considering new time series data, the topic might be interesting for academics focusing on public finance (especially fiscal policy), management staff (tax management), or policymakers.

There are several features differentiating this research from earlier analyses made, including the following facts:

– Available studies refer mostly to US and OECD countries and not to the EU, which is the concern of this article. Moreover, the set of EU countries changed lately following the exit of Great Britain.

– Previous studies tackle various taxes that are not always relevant for the EU. Here specifically, CIT – present in all EU states – is the tax whose performance is scrutinized.

– Existing empirical studies are not up to date and often the time span verified is limited to a dozen or so years. This research embraces a significantly longer period (from 1995 to 2020) and considers new data for recent years.

– Currently available research does not consider COVID-19 effects, for obvious reasons, and are less likely to anticipate other shocks such as those resulting from war in Ukraine. This gap is filled by this study.

– The existing literature seems not to be comprehensive enough with respect to analysis of determinants of CIT revenues (or the selection of such

determinants might be questionable). This study considers a greater set of factors that – following logical reasoning – could be important for the analysis of volume of CIT receipts.

– Some research was made solely by use of qualitative analysis. Here, quantitative verification is made.

– The instability of fiscal policy was analysed previously by predominantly focusing on government spending. This article – although it is not preoccupied primarily with volatility – deals with revenues and not expenses.

– The current literature often tries to assess the consequences of volatile taxes for the economy. The intention of this article is, however, to gain an in-depth knowledge of CIT revenue determinants without normative assessment. Awareness of those factors could be used later on to avoid excessive buoyancy of inflows from that tax.

The paper is organized as follows. The next section focuses on the most relevant literature. Section 3 describes the data and methodology employed in the empirical research. Section 4 presents results that are also discussed there. The last section summarises the findings and presents the main conclusions.

LITERATURE REVIEW

The level of taxes depend on the specificities of each single economy. A tax burden is often perceived as a price for a set of a certain basket of public goods. Tiebout [25] assumed that different regions offer a certain mix of public goods at various prices, whereas the price corresponds to the taxation burden imposed by each jurisdiction. Oates [26] claimed that governments competing for mobile capital are likely to keep taxes low to attract business investment. He spotted, however, limits of tax competition, as he admitted that due to lack of necessary funding there may well be a tendency toward less than efficient levels of output of local services. Fischel [27], White [28], and more recently Wellisch [29] argued that firms are able to change their residence according to their preferences depending on the

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[25] Tiebout, C. M. (1956). A Pure Theory of Local Expenditures. Journal of Political Economy, 64(5), pp. 416-424.

[26] Oates, W. E. (1972). Fiscal Federalism. New York: Harcourt Brace Jovanovich.

[27] Fischel, W. A. (1975). Fiscal and Environmental Considerations in the Location of Firms in Suburban Communities. In E. S. Mills, & W. E. Oates, Fiscal Zoning and Land Use Controls (pp. 119-173).

[28] White, M. J. (1975). The Effect of Zoning on the Size of Metropolitan Areas. Journal of Urban Economics, 4(2), pp. 279–290.

[29] Wellisch, D. (2000). The Theory of Public Finance in a Federal State. Cambridge University Press.

sets of public goods provided, at the tax cost to be borne in a particular region. Wildasin [30], and later Oates [31], underlined that decisions on location choice taken by investors largely depend on relative quality of public infrastructure across jurisdictions. Roin [32] argued that states propose different services for certain amounts of taxes. Pieretti and Pulina [33] claimed that initiatives against profit shifting may limit the process of transfer of the tax base abroad. Yet multinational corporations (MNC) may feel encouraged to show real economic substance in their offshore businesses to circumvent Base Erosion Profit Shifting (BEPS) regulations. In their opinion, a remedy for erosion of CIT revenues could be development of quality infrastructure, provided that at the same time, low-tax jurisdictions do not offer attractive agglomeration externalities for investors.

There are also studies that question the relation between the level of taxation and government services or claim that without tax competition, the size of the government would be excessive [34] [35] [36].

The mentioned studies deal with the desirable level of taxation and highlight the importance of taxes. Hence, they give us some hints on CIT revenue determinants. However, they do not focus precisely on keeping tax revenues on a desirable level. The issue of availability of economic sources is especially up to date in the face of COVID-19 pandemic or the war in Ukraine, which results in an increase in government spending combined with several allowances granted for economic agents. This obviously results in an increase of public debts of local economies. It might be assumed that states prefer foreseeable budget inflows to those, which are unpredictable. Volatile revenues impede their ability to run optimal fiscal policy.

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[30] Wildasin, D. E. (1989). Interjurisdictional Capital Mobility: Fiscal Externality and a Corrective Subsidy. Journal of Urban Economics, 25(2), pp. 193–212.

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[32] Roin, J. (2001). Competition and Evasion: Another Perspective on International Tax Competition. Georgetown Law Journal, 89, pp. 543, 549-586.

[33] Pieretti, P., & Pulina, G. (2020). Does eliminating international profit shifting increase tax revenue in high-tax countries? Economic Modelling.

[34] Plümper, T., Troeger, V. E., & Winner, H. (2009). Why is There No Race to the Bottom in Capital Taxation? International Studies Quarterly, 53(3), pp. 761–786.

[35] Brennan, G., & Buchanan, J. M. (1980). The Power to Tax: Analytical Foundations of a Fiscal Constitution. Cambridge University Press.

[36] Janeba, E. (1998). Tax competition in imperfectly competitive markets. Journal of International Economics, 44(1), pp. 135-153.

Studies for one country

First, researchers traditionally focused on the US. Auerbach and Poterba [37] were among the pioneers who made a contribution with respect to CIT revenue determinants. They found that the corporate profitability shapes CIT receipts more than any other determinant. Later on, these conclusions were again confirmed by Poterba [38]. Then, Auerbach repeated the research considering new time series data. He found that CIT revenues are higher when taxpayers are denied using tax losses data [39].

Clausing [40] believes that key challenges the US CIT system faces are connected with the relative attractiveness of taxation of non-corporate business income (and hence the incentive not to incorporate), narrowness of the CIT base, and excessive profit shifting of MNC. As a remedy she proposes, inter alia, (i) harmonization of tax treatment of business disregarding its legal form and sector of the economy an entity is active in, (ii) equal tax treatment of debt-financed and equity-financed investments, (iii) harmonization of tax treatment of labour and capital income, and (iv) a series of reforms curbing international profit shifting.

There are reasons to claim that CIT revenues depend, among other things, on the composition of industries in economy. For example, Menichini [41], who used US market data, spotted that revenue maximizing CIT rates differ across industries from 64% (services) to 74% (mining). He observed that the shape of the Laffer curve depends also on operating costs incurred by firms and market costs of capital. Breadth of the tax base also plays a role. He found that revenue maximizing tax rate is lower when the economic depreciation of fixed assets is more generous than tax depreciation.

Markets outside the US were also studied with the objective to identify CIT revenue determinants. Douglas [42], who questioned the reasons for decline of CIT receipts in Canada in the years 1960 – 1985, primarily blamed falling profitability

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[37] Auerbach, A. J., & Poterba, J. M. (1987). Why have corporate tax revenues declined? NBER Working Paper Series, 2118.

[38] Poterba, J. M. (1991). Why didn't the tax reform act of 1986 raise corporate taxes? NBER Working Papers, 3940.

[39] Auerbach, A. J. (2006). Why Have Corporate Tax Revenues Declined? Another Look. NBER Working Papers, 12463.

[40] Clausing, K. A. (2016). Strengthening the indispensable U.S. corporate tax. Washington Center for Equitable Growth.

[41] Menichini, A. (2020). How do firm characteristics affect the corporate income tax revenue? International Review of Economics and Finance.

[42] Douglas, A. V. (1990). Changes in Corporate Tax Revenue. Canadian Tax Journal, pp. 66-81.

of companies. Devereux et al. [43] scrutinized the United Kingdom. According to their research, important determinants of CIT receipts included the following: size of the corporate sector, high profitability of financial institutions, and breadth of the legally set tax base. Becker and Fuest [44], who analysed Germany, found that higher internationalization levels support CIT revenues.

Studies for one CIT revenue determinant

Another group of studies constitutes works where the key objective was an explanation of the impact of one selected CIT revenue determinant. This research considered one or several countries. Gropp and Kostial [45] examined data for 19 OECD states for the years 1988 – 1997 and debated the impact of foreign direct investment ('FDI') on CIT records. They found that in (out) flows of FDI had a positive (negative) impact on CIT receipts. Slemrod [46] discussed the degree of openness of the economy based on several countries for the period 1975 – 1995. Riedl and Rocha-Akis [47] employed data for 17 OECD states for the years 1982 – 2005 and focused on CIT rates. They concluded that CIT revenues of one state significantly depend on the CIT rates level both in-house and in the neighbouring countries. Huňady and Orviská [48] analysed how corruption affects tax revenues. Their study made with use of data for OECD and Latin American states for the period 1998 – 2013. They estimated that corruption indeed negatively impacts the amount of tax revenues, whereas the effect is particularly severe for indirect taxes. This latter finding does not fully correspond with the earlier estimates of Gupta and Abed [49], who claimed that indeed corruption erodes tax revenues, but especially those from income taxes are jeopardized. Cobham and Janský [50] analysed a large sample of countries in order to estimate losses from profit shifting

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[43] Devereux, M. P., Griffith, R., & Klemm, A. (2004). Why has the UK corporation tax raised so much revenue? Fiscal Studies, 25(4), 367–388.

[44] Becker, J., & Fuest, C. (2010). Internationalization and business tax revenue—evidence from Germany. International Tax and Public Finance, 17(2), pp. 174-192.

[45] Gropp, R., & Kostial, K. (2000). The Disappointing Tax Base: Is Foreign Direct Investment (FDI) Eroding Corporate Income Taxes? IMF Working Paper, WP/00173.

[46] Slemrod, J. (2004). Are corporate tax rates, or countries, converging? Journal of Public Economics, 88(6), pp. 1169-1186.

[47] Riedl, A., & Rocha-Akis, S. (2012). How elastic are national corporate income tax bases in OECD countries? The role of domestic and foreign tax rates. 45(2), pp. 632-671.

[48] Huňady, J., & Orviská, M. (2015). The effect of corruption on tax revenue in OECD and Latin America countries. THEORETICAL AND PRACTICAL ASPECTS OF PUBLIC FINANCE. Prague.

[49] Gupta, S., & Abed, G. T. (2002). Governance, Corruption, & Economic Performance.

[50] Cobham, A., & Jánský, P. (2018). Global distribution of revenue loss from corporate tax avoidance: re-estimation and country results. Journal of International Development.

with respect to CIT. They claim that global revenue loss amounts to ca. USD 500 billion p.a., whereas in percentage terms, highest losses are suffered by low- and middle-income economies.

Janský and Palanský [51] noted that income shifting to low tax jurisdictions by multinational corporations affect the CIT revenues of counties where value added were indeed created. They observed that the higher the rate of FDI directed from tax havens, the lower the rate of return reported by local subsidiaries to the tax authorities. This might be explained by the fact that a significant part of the earnings was transferred to headquarters located in a low-tax country. They observed also that profit shifting affects CIT revenues of low and middle-income countries. However, in OECD states, the mechanism also exists.

There have been articles published on the influence of the breadth of the CIT base on level of revenues from that tax. However, this issue – although important – is very underrepresented. Kawano and Slemrod [52] analysed the interaction between corporate tax rate and tax base changes, and their implications for corporate tax revenues. Based on data for OECD countries between 1980 and 2004, they confirmed that tax rate decreases are generally accompanied by legal base-broadening reforms. They underlined also that the trends in tax base setting significantly vary among states. They underlined that to date, economists have failed to estimate thoroughly the changes in the CIT legal base in particular countries. Serrato and Zidar [53] analysed data for the US and claimed that legal tax base rules turned out to be more important for CIT revenues than rates of that tax. Furthermore, they estimated that over time, the relationship between tax rates and tax revenues has diminished.

Studies for (i) a number of CIT revenue determinants and (ii) group of countries

Lastly, some more comprehensive research was performed where at the same time both (i) several factors and (ii) a number of countries – generally those belonging to OECD – were considered. Clausing [54] employed data for OECD countries for the period 1979 – 2002. In her regression model, she selected the

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[51]   Palanský, M., & Janský, P. (2019). Estimating the scale of profit shifting and tax revenue losses related to foreign direct investment. International Tax and Public Finance.

[52]   Slemrod, J., & Kawano, L. (2016). How Do Corporate Tax Bases Change When Corporate Tax Rates Change? With Implications for the Tax Rate Elasticity of Corporate Tax Revenues. International Tax and Public Finance.

[53]   Serrato, J. C., & Zidar, O. M. (2017). The Structure of State Corporate Taxation and Its Impact on State Tax Revenues and Economic Activity. NBER Working Paper.

[54]   Clausing, K. (2007). Corporate tax revenues in OECD countries. International Tax and Public Finance, 14(2), pp. 115-133.

following independent variables: corporate profitability, size of the corporate sector, and statutory CIT rate, which she proved to be significant. Devereux [55] considered data for 20 OECD countries for years 1965 – 2004. In his analysis, he focused on profit shifting, depreciation allowances, and corporate taxation rates. Kubatova and Rihova [56] worked on OECD data for 1980 – 2006. For explanatory variables, they selected profit potential, tax rate, tax evasion, cyclicality of the economy, and size of the corporate sector.

Devereux et al. [57], who analysed the CIT developments in OECD countries from 1965 to 1999, showed that the legal tax base broadening processes have been achieved by reduction of accelerated depreciation schemes, limitation of loss offset abilities, restrictions on interest deductibility or refusal to treat certain expenses as tax deductible, etc.. However, these actions did not fully offset the fall of statutory CIT rates. As a result, over the 1980s and 1990s, the effective average tax rates decreased – especially for projects with higher profitability.

Tahlova nad Banociova [58] built a panel regression model for EU-28 for the period 2007-2016. They analysed several factors that could influence the size of CIT revenues and confirmed that inflows to the government from that tax depend both on legislative actions and also include factors not related to CIT law. They noticed that CIT inflows are specific for each state, change constantly, and interact with other taxes. They claim that methodology and components used by researchers to assess the CIT revenues determinants influence the results significantly.

RESEARCH METHODOLOGY AND DATA SOURCES

A quantitative approach has been used to analyse the empirical data. Analysis has been performed with extensive use of publicly available sources that are appropriately processed. As mentioned earlier, the subject of the research includes all EU Member States. The selection of this set of countries has advantages from a research perspective. All of them are relatively homogeneous. Most of them are developed economies. The portfolio of taxes they impose is comparable (i.e. all systems include personal income taxes, social security contributions, harmonized

[55] Devereux, M. P. (2007). Developments in the taxation of corporate profit in the OECD since 1965: Rates, bases and revenues. Working Papers, 0704.

[56] Kubatova, K., & Rihova, L. (2008). Factors affecting revenues from corporate tax. Structural Distortions of Taxation and Investment Decision. Czech Science Foundation.

[57] Devereux, M. P., Griffith, R., & Klemm, A. (2002). Corporate income tax reforms and international tax competition. Economic Policy, 35, pp. 451-495.

[58] Banociova, A., & Tahlova, S. (2019). Assessment of Corporate Income Tax Revenues in the Light of Their Current Determinants. Montenegrin Journal of Economics.

over the whole UE value added taxes and excise duties, as well as CIT – revenues from which are the focal point of this study).

The period considered is from 1995 to 2020, which is determined by the availability of complete data. It is also a time span of relatively stable fiscal policy of most of the EU Member States, in the sense that all key taxes were present in that period in all jurisdictions.

Analysis was completed with the usage of panel regression, which is an appropriate tool for such studies and should provide satisfactory verification of the hypotheses. This method is likely to produce the most valuable information from the data available, as it is the most effective. Since the aim of the study was to explain the impacts on the level of budget inflows from CIT, the value of revenues (in EUR mln) from that tax was selected for a dependent variable. While considering the author's expert knowledge and earlier studies focusing on the issue, a selection of explanatory variables was made that could potentially impact the level of CIT revenues. This set included determinants of macroeconomic, social, and business natures (information on variables is included in Table 1).

All figures were sourced from Eurostat and annual European Commission publication on 'Taxation Trends in the European Union'. This approach assured the relative homogeneity of data across jurisdictions. In some cases, it turned out that although following rationale reasoning particular determinant should have been considered for the model, there was no possibility to use it due to lack of complete numbers for either all Member States or years (in Eurostat or other databases). It was decided to use only those determinants that provided comprehensive (or almost complete) numbers for all periods. Imputation for statistical purposes was used only in exceptional cases: (i) when missing observations were few, and (ii) provided that the volatility of a particular determinant was low. For these conditions, a determinant was not included in the model.

A statistically balanced panel was arrived at, which at the same time included the longest time series among comparable studies that have been made so far. The dependence of CIT revenues on selected explanatory variables was assessed by estimation of the following model:

$$TaxRev_{it} = \beta_0 + \beta_1(TAX)_{it} + \beta_2(ECON)_{it} + \beta_3(INTER)_{it} + \beta_4(BA)_{it} + \beta_5(POP)_{it} +$$

$$\beta_6(GOV)_{it} + \omega_i + \varepsilon_{it}$$

where $TaxRev_{it}$ are the revenues from CIT (in mEUR) of country i in year t, TAX represents top statutory CIT or top PIT rates in respective jurisdictions and years, $ECON$ is a vector of variables representing the general economy, $INTER$ represents the internationalisation, BA is a vector of variables concerned with

business activities, *POP* is a vector of variables representing the population, and *GOV* is a vector of variables representing the government finance, whereas ω_i – stands for unobservable individual effects specific for particular state, and ε_{it} is an error term.

This study was made with use of the Fixed effects model ('FE model') rather than random effects model. The are several reasons for its selection, specifically:

– EU Member States are believed to have specific features typical for each jurisdiction, that sometimes are not quantifiable or non-observable;

– The used sample is not coincidental – i.e. all countries in the European Union are included in the research and not only selected ones (in other words, observations cannot be described as random);

– The intention was to control for variables within a particular state rather than between them;

– In several cases, the format of the source data better suits the fixed effects model rather than the random effects model as numbers are often expressed in nominal and not relative terms.

The above arguments are consistent with results of Hausman tests, which in all modifications of estimated model that were run give a very low p-value, suggesting that the null hypothesis claiming that the RE model estimator is appropriate should be rejected for the benefit of the alternative hypothesis stating that the FE model is preferred.

The model was run several times. Initially, all variables were included in the model (Table 2. Estimations' results - Model I). When the model was estimated, some variables turned out to be insignificant. Therefore, some of them were eliminated: first, those that following logical reasoning seemed to be collinear, and at the same time were most insignificant in a statistical sense. As a result, the second model was estimated (Table 3. Estimations' results - Model II). Having arrived at the final model, particular variables were interchanged one by one with those that were eliminated at an earlier stage (due to insignificance and taking into consideration collinearity limitations). However, the results of estimation were always less satisfactory than those achieved with Model II (i.e. less significance). The models were thoroughly statistically tested. The results of the estimations will now be discussed, taking into consideration existing literature and the professional experience of the author.

RESULTS

The estimation was made several times until the best quality model was arrived at. When considering all 16 available variables, only 9 of them turned out

to be significant. They included top statutory CIT rates, GDP, globalization index, scale of financial activities, expenditures for R&D, quantity of active population, citizens with tertiary education, active population, and public debt to GDP ratio (Table 2. Estimations' results - Model I). Next, some determinants were eliminated from the model – those that proved to be insignificant and/or are likely to measure similar developments and should behave over time following the same pattern (e.g. Unemployment and active population).

Finally, 8 determinants turned out to be significant at least at the 0.05 level (Table 3. Estimations' results - Model II). Unsurprisingly, the model shows a highly positive effect of statutory CIT rates level on revenues from that tax. Higher GDP – which should be perceived as a proxy for corporate profitability – should also lead to greater inflows from the taxation of income of corporations, which is again in line with expectations and numerous studies [59].

Internationalization also boosts inflows from CIT. This finding is interesting, as it might be in opposition to several pieces of literature that stress high mobility of capital and tax competition between states. Indeed, it is a reasonable assumption that MNCs tend to contribute less to CIT revenues relative to local firms - as shown by Bilicka [60]. Yet, it should be noted that the internationalization index used here is of a very complex nature and could be perceived as a measure of general development of a particular economy. In this view, it is not surprising that the more an economy advances, the more revenues from CIT it raises. Amendolagine et. al. [61] underlines that higher capital mobility may contribute to technological advances and eventually to higher tax revenues.

The above claim is also in line with another finding of this study, which confirms that the value of R&D expenditures of business entities has a positive impact on the dependent variable. This could be linked with the fact that these could be primarily the companies that incur such expanses, whereas smaller unincorporated businesses (which are because of their legal form not subject to CIT) invest in R&D to a lesser extent.

The scale of financial and insurance activities tends to be negatively linked with inflows from CIT. This is a surprising observation, as in the literature there is a claim that as financial institutions are usually incorporated, the correlation should be positive. The results of the considered study may not follow other findings in this respect, as here a broad spectrum of states was analysed, whereas

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[59] e.g. Helcmanovská, M., & Andrejovská, A. (2021). Tax Rates and Tax Revenues in the Context of Tax Competitiveness. Journal of Risk and Financial Management.

[60] Bilicka, K. (2022). Why are the Contributions of Multinational Firms to Corporate Tax Revenues Declining? OXFORD BULLETIN OF ECONOMICS AND STATISTICS.

[61] Amendolagine, V., De Pascale, G., & Faccilongo, N. (2021). International capital mobility and corporate tax revenues: How do controlled foreign company rules and innovation shape this relationship? Economic Modelling.

several countries do not feature a highly developed financial sector. Moreover, approximately half of EU Member States introduced bank taxes in the early 2010s, which feature different taxation schemes and are subject to further amendments. Therefore, this significant sector tax could have an impact on financial institutions, whereas due to relatively recent introduction of this tax, earlier studies could not consider its potential impact on CIT. Finally, some researchers underline the importance of a balanced portfolio of business sectors for tax revenues, which at the same time suggest the lesser importance of commercial banks for inflows from CIT [62].

The total number of the employed population also positively correlates with CIT revenues. This is again a reasonable outcome, suggesting that the employed population supports inflows from taxes imposed on income of corporations.

A higher age dependency ratio – defined as population 0 to 19 years and 65 years or over to population 20 to 64 years – transforms into lesser revenues from CIT. This is a reasonable finding, as a higher share of citizens that do not work should affect the profitability of companies and hence CIT revenues.

Finally, the higher public debt is, the lower inflows from CIT should be. This is a sensible outcome, as higher gap between state expenditures and inflows from taxes (including CIT) may indicate worsening economic performance.

There are several variables which turned out not to be significant. They included statutory PIT rates, which is often perceived as a CIT backstop [63]. It may be the case that in fact there are not so many enterprises that select organizational form depending on the level of income tax rates (by comparing PIT and CIT legislation). Moreover, countries tend to adjust PIT rates to CIT rates to keep the balance and not to motivate economic agents to act under specific legal form solely for the purpose of tax optimization. This may to some extent explain the statistical insignificance of personal taxation rates.

According to the model, HICP inflation does not have an influence on budget revenues from the taxation of income of corporations. This conclusion seems reasonable, as value of money should not be connected with profitability or size of the corporate sector.

The shadow economy proved also not to be important. This finding is surprising at first glance. However, there might be at least two reasons for such a result. Firstly, raw data on the size of the shadow economy are just an approximation rather than accurate firm values and may be imprecise. More importantly, one can easily assume that entities active in the shadow economy are of a smaller size. Therefore, the impact on PIT revenues is much more likely to be expected. A

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[62]   e.g. Malkina, M. Y. (2021). How the 2020 pandemic affected tax revenues in Russian regions? *Equilibrium-Quarterly Journal of Economics and Economic Policy.*

[63]   Slemrod, J. (2004). Are corporate tax rates, or countries, converging? *Journal of Public Economics*, 88(6), pp. 1169-1186.

similar measure to the shadow economy might be a scale of corruption, which may be considered for further studies. For example, Capasso et al. [64], working on Italian data, confirmed that corruption significantly affects tax revenues, whereas the negative impact is much stronger with respect to CIT rather than PIT.

Information on the total population, active population, and unemployment rate was eliminated from the model for statistical reasons for reasonably correlating with total employment, which – as mentioned above – proved to be significant. The share of people with tertiary education was not significant as well. Although it could be expected that more educated people are employed in corporations, it may be as well the case that individuals with higher qualifications work on a self-employment basis or run small businesses. The Gini coefficient proved not to exert impact on revenues from CIT neither.

The model was reviewed statistically. Taking into consideration the F statistics value, it should be stated that the model as a whole is statistically significant. R2 achieves a level of 0.97 and adjusted R2 exceeds 0.7, which speaks for the explanatory value of the model. The Wald test reveals that since Chi-square statistics are significant (p-value less than 0.05), the null hypothesis of the common intercept should be rejected, and consequently it turns out that FE model is more appropriate than Ordinary Least Squares model. Thus, accounting for heterogeneity is important in determining how selected independent variables affect CIT revenues. Results of the Chi-test performed confirm the normal distribution of residuals. Among the determinants which were finally used in the model, there are no variables that feature medium or high correlation (this is also confirmed by low VIF for the selected determinants). As may be expected, Durbin-Watson statistics confirms that there is almost no autocorrelation issue. According to the performed test, the group has no common intercept. Further to the Pesaran CD test, there is no cross-sectional dependence in residuals. It was decided not to lag any regressors, as there are no obvious reasons to do so (and this would also limit the degrees of freedom, which is not desirable).

Conclusions

Estimations in this study were performed on a very broad panel of data with relatively high variability. Therefore, the results seem robust and are informative. Importantly, the vast majority of determinants proved to exert impact on CIT revenues in a positive or negative way, as can be reasonably expected.

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[64]   Capasso, S., Cicatiello, L., De Simone, E., & Santoro, L. (2021). Corruption and tax revenues: evidence from Italian regions. Annals of Public and Cooperative Economics.

It was confirmed that Member States indeed are able to affect the value of CIT revenues by usage of certain controllable factors – such as CIT rate. But most determinants of CIT inflows cannot be managed directly. Therefore, the first hypothesis stated in this article was positively verified. Although while focusing on coefficients, the level of CIT rate seemed to be crucial for the level of CIT revenues, the second hypothesis claiming that determinants that could be directly influenced by the government are of lesser importance for the value of CIT revenues than uncontrollable determinants considered altogether should also be confirmed.

A practical hint for policymakers that arises from this study comes down to the fact that boosting CIT revenues is a long-term process, and the issue cannot be swiftly managed solely through introduction of optimal legislative measures. Therefore, governments should do their best to develop the economy as a whole. Particular attention should be paid to the degree of internationalization (in economic, social and political spheres), innovations (by directing sources for the sake of development of modern economy or creating friendly legislative and infrastructural environment for R&D), and by boosting employment in society. All of these and other actions should contribute to an overall GDP increase, which also positively impacts revenues from CIT (whereas it should be underlined that over the last two decades in the EU, CIT inflows were generally more sensitive to economic conditions than GDP level – in particular, CIT revenues in percentage terms tend to rise even faster than GDP, and concurrently fall quicker than GDP in harsh times). Governments should also focus on demographics, as according to the results of the study, the higher the age dependency ratio, the lesser the inflows from business tax. Interestingly – at least as long as the primary objective of a government would be rising sources from taxation of income of corporations – actions aimed at an increase of the share of financial and insurance activities at the expense of traditional industries might turn out to be counterproductive. The reason might be the ease of capital shifting to other jurisdictions that is typical for the financial sector. Finally, the study confirms that in general, higher public deficits pose a threat to revenues from CIT.

The findings presented in this article should contribute to sustainable fiscal policy. There might be a need to repeat such a study with the implementation of additional dependent variables, for other regions or periods (i.e. encompassing not only COVID impact for 2020 but also for 2021, as well as the effect of the war in Ukraine in periods going forward) or with use of modified statistical methods.

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ANNEX

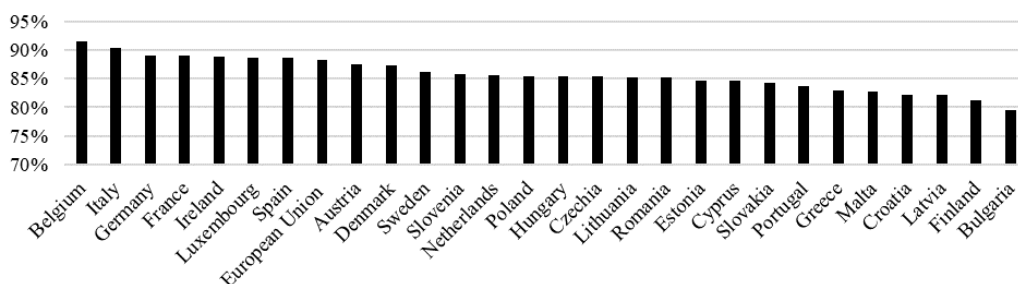### Tax revenues as a share of total budget (2020)

Figure 1: Total tax revenues as a share of total budget in EU Member States in 2020
Source: Self-prepared based on Eurostat data

Table 1: Dependent variables used in the model

Diagnostic variables	Description
Taxation of income (TAX)	
Statutory top personal income tax rates (PIT)	Top statutory personal income tax rates (including surcharges)
Statutory top corporate income tax rates (CIT)	Top statutory tax rate on corporate income
General economy (ECON)	
Harmonised Index of Consumer Prices (HICP)	It measures the change over time in the prices of consumer goods and services acquired, used or paid for by EU households
GDP growth (GDP)	Annual growth of GDP
Estimated share of shadow economy to total GDP (SoS)	Market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP
Internationalisation (INTER)	
KOF Globalisation Index by ETH Zurich (KOF)	The KOF Globalisation Index measures the economic, social, and political dimensions of globalisation
Business (BA)	
Financial activities (FA)	Value of financial and insurance activities
R&D expenditures (R&D)	R&D expenditures in business sector
Population (POP)	
Employment (EMPL)	Total employment according to national concept
Total population (TPOP)	Total population in the analysed countries

Continued Table 1: Dependent variables used in the model

Diagnostic variables	Description
Age dependency (ADEP)	Age dependency ratio, (population 0 to 19 years and 65 years or over to population 20 to 64 years)
Unemployment rate (UNEM)	The share of unemployed persons in the economically active population
Tertiary education (TER)	The educational level following the completion of secondary education
Active population (APOP)	Active population of 15 years and over
Gini coefficient (GINI)	A measure of statistical dispersion intended to represent the income inequality or wealth inequality within a nation or any other group of people
Government finance (GOV)	
Government debt (DEBT)	General government debt

Table 2: Estimations' results - Model I

Model 1: Fixed-effects, using 702 observations
Included 27 cross-sectional units
Time-series length = 26
Dependent variable: CITrevenues

	Coefficient	Std. Error	t-ratio	p-value	
const	−9446.37	7256.80	−1.302	0.1935	
CIT	195.077	30.6151	6.372	<0.0001	***
PIT	−4.23076	23.6528	−0.1789	0.8581	
HICP	−12.7697	19.9956	−0.6386	0.5233	
GDP	0.0272787	0.00367193	7.429	<0.0001	***
SoS	40.6442	64.4585	0.6305	0.5286	
KOF	121.718	42.3527	2.874	0.0042	***
FA	−0.0768516	0.0375220	−2.048	0.0409	**
R&D	0.206338	0.104559	1.973	0.0489	**
EMPL	1.65395	0.435037	3.802	0.0002	***
TPOP	−0.237152	0.327177	−0.7248	0.4688	
ADEP	−58.5603	39.6073	−1.479	0.1397	
TER	49.1665	26.5882	1.849	0.0649	*
APOP	−1.10486	0.470759	−2.347	0.0192	**
UNEM	54.6615	55.1328	0.9915	0.3218	
GINI	−59.0205	64.0688	−0.9212	0.3573	
DEBT	−38.3517	10.0779	−3.806	0.0002	***

_{Continued}Table 2: Estimations' results - Model I

Mean dependent var	9711.222	S.D. dependent var	15755.33
Sum squared resid	4.93e+09	S.E. of regression	2736.255
LSDV R-squared	0.971645	Within R-squared	0.713428
LSDV F(42, 659)	537.6731	P-value(F)	0.000000
Log-likelihood	−6529.779	Akaike criterion	13145.56
Schwarz criterion	13341.38	Hannan-Quinn	13221.24
rho	0.564435	Durbin-Watson	0.837660

Significance levels (p-value): If a p-value is less than 0.05, it is flagged with one star (*); if less than 0.01, then with 2 stars (**) and if less than 0.001, it is flagged with three stars (***)

Table 3: Estimations' results - Model II

Model 2: Fixed-effects, using 702 observations
Included 27 cross-sectional units
Time-series length = 26
Dependent variable: CITrevenues

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−13518.2	4468.53	−3.025	0.0026	***
CIT	179.205	28.0727	6.384	<0.0001	***
GDP	0.0234881	0.00299545	7.841	<0.0001	***
KOF	136.631	31.5888	4.325	<0.0001	***
FA	−0.0836872	0.0366288	−2.285	0.0226	**
R&D	0.320993	0.0859122	3.736	0.0002	***
EMPL	0.774642	0.287798	2.692	0.0073	***
ADEP	−76.3951	35.7955	−2.134	0.0332	**
DEBT	−34.6779	6.95062	−4.989	<0.0001	***

Mean dependent var	9711.222	S.D. dependent var	15755.33
Sum squared resid	5.10e+09	S.E. of regression	2765.247
LSDV R-squared	0.970690	Within R-squared	0.703770
LSDV F(34, 667)	649.6905	P-value(F)	0.000000
Log-likelihood	−6541.413	Akaike criterion	13152.83
Schwarz criterion	13312.21	Hannan-Quinn	13214.43
rho	0.571912	Durbin-Watson	0.826167

Significance levels (p-value): If a p-value is less than 0.05, it is flagged with one star (*); if less than 0.01, then with 2 stars (**) and if less than 0.001, it is flagged with three stars (***)