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**PERSONAL INCOME TAXES IN BULGARIA, HUNGARY AND ROMANIA:  
A BUSINESS CYCLE PERSPECTIVE**

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**Abstract**

Employing quarterly seasonally adjusted Eurostat data for the period 1995-2020, the Hodrick-Prescott filter and the correlations between the output gap and the changes in the trend shares and the cyclical shares of total income tax revenue in GDP, this paper attempts to compare the cyclical impact of progressive and proportional income taxes in Bulgaria, Hungary and Romania. The research results imply that in Hungary discretionary and automatic changes in income tax revenue are countercyclical under both progressive and proportional taxation but income tax discretion and automatic stabilizers are more effective under progressive taxation. In Bulgaria discretionary and automatic changes in income tax revenue are procyclical under proportional taxation and countercyclical under progressive taxation. In Romania, discretionary changes in income tax revenue are procyclical under both progressive and proportional taxation but automatic changes in income tax revenue exacerbate cyclical fluctuations under proportional taxation and mitigate business cycle volatility under progressive taxation. It may be inferred that in all three analyzed countries, the efficiency of income tax discretion and automatic stabilizers under progressive taxation is higher than under proportional taxation. From a business cycle standpoint, it is advisable that Bulgaria, Hungary and Romania switch from proportional to progressive income taxation.

**Keywords**

Personal income tax – Business cycle – Bulgaria – Hungary – Romania

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PH. D. IVAN KRUMOV TODOROV



## Introduction

The cyclicity of fiscal policy has been broadly discussed in economic literature. However, most of the research has concentrated on the nexus between the business cycle and government expenditure, while the relationship between cyclical fluctuations and government revenue (which comes mainly from taxes) has not been sufficiently studied.

This paper aims to shed some light on the link between cyclical volatility and tax revenue by investigating progressive and proportional income taxation in Bulgaria, Hungary and Romania from a business cycle perspective. The actual tax policy is a combination of the active tax policy (the government discretion) and the passive tax policy (the functioning of taxes as automatic fiscal stabilizers). For example, the actual tax revenue is sum of the trend tax revenue (a proxy of active tax policy) and the cyclical tax revenue (a proxy of the work of taxes as automatic fiscal stabilizers). Statistical filters can be used to decompose tax variables into a trend (discretionary, active) component and a cyclical (passive, automatic) component.

The aim of the paper has been achieved by the fulfillment of two tasks: first, an empirical analysis of the cyclical impact of discretionary income tax policy in Bulgaria, Hungary and Romania under progressive income tax and under proportional income tax (section two); and second, an empirical assessment of the functioning of progressive income tax and proportional income tax in Bulgaria, Hungary and Romania as automatic stabilizers (section three). The research methodology includes the Hodrick-Prescott filter and the correlations between the output gap and the changes in the trend shares and the cyclical shares of total income tax revenue in GDP.

The study uses quarterly seasonally adjusted Eurostat data for the periods 1999-2019 (for Bulgaria), 1999-2020 (for Hungary) and 1995-2020 (for Romania). Two data samples have been created for each country - a sample of progressive income taxation and a sample of proportional income taxation. The correlations between the output gap and the changes in the trend shares and the cyclical shares of total income tax revenue in GDP have been calculated for separately for each sample.

## Literature review

Attinasi et al.<sup>1</sup> empirically examine the influence of the progressivity of personal income tax on output volatility in thirty OECD countries during 1982-2009. They ascertain that the higher the progressivity of personal income tax is, the lower output fluctuations are and the stronger automatic stabilizers are.

Bogdanov<sup>2</sup> finds out (based on empirical research on seven developed and twenty-three developing countries from 1972 to 2001) that the fiscal policy of developed nations tends to be countercyclical, while the one of the developing states seems to be acyclical.

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<sup>1</sup> Maria Attinasi; Cristina Checherita-Westphal and Malte Rieth, "Personal Income Tax Progressivity and Output Volatility: Evidence from OECD Countries", ECB Working Paper No. 1380 (2011), Available at SSRN: <https://ssrn.com/abstract=1920821>.

<sup>2</sup> Bogdan Bogdanov, "Cyclical Policy over the Business Cycle: An Empirical Study on Developed and Developing Countries", Agency for Economic Analysis and Forecasting Working Paper Series 12010en (2010), Available at: [https://www.researchgate.net/publication/46453858\\_Cyclical\\_Policy\\_over\\_the\\_Business\\_Cycle\\_an\\_Empirical\\_Study\\_on\\_Developed\\_and\\_Developing\\_Countries](https://www.researchgate.net/publication/46453858_Cyclical_Policy_over_the_Business_Cycle_an_Empirical_Study_on_Developed_and_Developing_Countries).

Boschi and d'Addona<sup>3</sup> estimate the short- and long-run elasticities of tax revenue with respect to national income for 15 European countries from 1980 to 2013. They conclude that the short-run tax elasticities of indirect taxes, social contributions and corporate income taxes vary over the business cycle, but the short-term buoyancy of personal income tax remains relatively unchanged in the course of the economic cycle.

Hayo<sup>4</sup> infers that tax policy is a powerful tool for business cycle stabilization since tax multipliers usually vary from -1 to -3. However, policymakers should bear in mind that because of the endogeneity problem (the two-direction relationship between tax revenue and economic activity) the estimates of tax multipliers are subject to a high degree of uncertainty.

According to Kodrzycki<sup>5</sup>, personal income tax is the biggest source of tax revenue in 41 states in the USA, but its increased sensitivity to cyclical fluctuations after 2000 made the fiscal stances of these states more vulnerable to changes in economic activity.

Listokin<sup>6</sup> advocates that the efficiency of personal income tax as an automatic stabilizer be raised by increasing marginal tax rates during expansions and decreasing them in recessions. Thus government deficits will decline more in booms and grow up more in busts, additionally mitigating the impact of shocks on the economy.

Machado and Zuloeta<sup>7</sup> estimate the short-term and the long-term buoyancies of corporate income tax, personal income tax, value-added tax and overall taxes in eight Latin American countries for the period 1990-2010.

An interesting inference from this study is that personal income tax in Brazil and Colombia shows larger fluctuations over the business cycle than growth potential in the long run.

Sancak et al.<sup>8</sup> find a positive and significant relationship between tax revenue efficiency and the output gap in 84 advanced and developing economies from 1995 to 2009. The authors recommend that in big economic ups and downs policymakers include in their analysis the impact of the business cycle on tax revenue efficiency.

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<sup>3</sup> Melisso Boschi and Stefano d'Addona, "The Stability of Tax Elasticities over the Business Cycle in European Countries", CAMA Working Paper No. 44/2017 (2017), Available at <http://dx.doi.org/10.2139/ssrn.3005694>.

<sup>4</sup> Bernd Hayo (eds), Tax policy as a tool for business cycle stabilization (Open access government, 2020), (Available at <https://www.openaccessgovernment.org/tax-policy-as-a-tool-for-business-cycle-stabilisation/80698/>), (accessed on 1 October 2020).

<sup>5</sup> Yolanda Kodrzycki, "Smoothing state tax revenues over the business cycle: gauging fiscal needs and opportunities", Federal Reserve Bank of Boston Working Papers 14-11 (2014), Available at SSRN: <https://ssrn.com/abstract=2555870> or <http://dx.doi.org/10.2139/ssrn.2555870>.

<sup>6</sup> Yair Listokin, "Stabilizing the Economy through the Income Tax Code", Tax Notes 123: 13 (2009), Available at SSRN: <https://ssrn.com/abstract=1466859>.

<sup>7</sup> Roberto Machado and Jose Zuloeta, "The Impact of the Business Cycle on Elasticities of Tax Revenue in Latin America", Inter-American Development Bank Publications (Working Papers) 4064 (2012), Available at: <https://publications.iadb.org/en/publication/11072/impact-business-cycle-elasticities-tax-revenue-latin-america>.

<sup>8</sup> Cemile Sancak; Ricardo Velloso and Jing Xing, "Tax Revenue Response to the Business Cycle", IMF Working Paper No. 10/71 (2010), Available at SSRN: <https://ssrn.com/abstract=1578669> or DOI:<http://dx.doi.org/10.5089/9781451982145.001>.

Sobel and Holcombe<sup>9</sup> demonstrate that a tax with a small estimated elasticity may fluctuate highly over the business cycle. They make a distinction between the long-term growth potential (the long-run elasticity) and cyclical variability (the short-term elasticity) of state tax bases in the United States.

Srebrnik and Strawczynski<sup>10</sup> show that changes in tax rates (a rise in bad times and a reduction in good times) are procyclical in developed and developing economies. High foreign indebtedness raises the procyclicality of tax rates in developing countries, but the opposite occurs in developed nations.

Strawczynski<sup>11</sup> finds that in Israel discretionary changes in direct taxes rates are acyclical, but those in indirect taxes rates are procyclical. The main reason for statutory tax changes is the existence of economic crises. Analyzing 56 economies, Talvi and Vegh<sup>12</sup> conclude that tax policy is acyclical in developed countries and procyclical in developing countries. Since in developing economies budget surpluses create pressures for a rise in public spending and the tax base is highly volatile, governments are forced to pursue procyclical tax policy. According to Vegh and Vuletin<sup>13</sup>, government expenditure has a procyclical impact in developing countries but tax policy should also be investigated in order to properly assess the overall fiscal stance. The authors infer that tax policy tends to be procyclical in developing and acyclical in developed economies.

Vegh and Vuletin<sup>14</sup> explore tax rates for 62 countries for the period 1960-2013 and conclude that tax policy is typically acyclical in industrial nations but predominantly procyclical in developing economies. The improvement in the quality of institutions and the deeper integration in the world financial markets can make tax policy less procyclical or more countercyclical.

### **Empirical analysis of the cyclical impact of discretionary income tax policy in Bulgaria, Hungary and Romania under progressive income tax and under proportional income tax**

The cyclical impact of discretionary income tax policy in Bulgaria, Hungary and Romania under progressive income tax and under proportional income tax has been measured by the correlation between the output gap and the change in the trend share of total income tax revenue in GDP.

<sup>9</sup> Russel Sobel and Randall Holcombe, "Measuring the Growth and Variability of Tax Bases Over the Business Cycle", *National Tax Journal* Vol: 49 num 4 (1996): 535-552, Available at: <https://www.ntanet.org/NTJ/49/4/ntj-v49n04p535-52-measuring-growth-variability-tax.pdf>.

<sup>10</sup> Noa Srebrnik and Michel Strawczynski, "Cyclicality of taxes and external debt", *Applied Economics* Vol: 48 num 48 (2016): 4622-4634, Available at SSRN: <https://ssrn.com/abstract=2666487> or <http://dx.doi.org/10.2139/ssrn.2666487>.

<sup>11</sup> Michel Strawczynski, "Cyclicality of Statutory Tax Rates", *Israel Economic Review* Vol: 11 num 1 (2014): 67-96, Available at: [ftp://repec-boi.northeurope.cloudapp.azure.com/RePEc/boi/iserv/IsER\\_11\\_2014\\_1\\_067-096.pdf](ftp://repec-boi.northeurope.cloudapp.azure.com/RePEc/boi/iserv/IsER_11_2014_1_067-096.pdf).

<sup>12</sup> Ernesto Talvi and Carlos Vegh, "Tax base variability and procyclical fiscal policy in developing countries", *Journal of Development Economics* Vol: 78 num 1 (2005): 156-190, Available at: <https://doi.org/10.1016/j.jdeveco.2004.07.002>.

<sup>13</sup> Carlos Vegh and Guillermo Vuletin, eds., *Tax-policy procyclicality* (Voxeu, 2013), (Available at: <https://voxeu.org/article/tax-policy-procyclicality>), (accessed on 1 October 2020).

<sup>14</sup> Carlos Vegh and Guillermo Vuletin, "How Is Tax Policy Conducted over the Business Cycle?", *American Economic Journal: Economic Policy* Vol: 7 num 3 (2015): 327-370, Available at: DOI: 10.1257/pol.20120218.

If this correlation is positive, the income tax discretion is countercyclical. If this correlation is negative, the income tax discretion is procyclical. A positive correlation between the output gap and the change in the trend share of total income tax revenue in GDP may arise in two cases: first, a positive (inflationary) output gap and a positive change (increase) in the trend share of total income tax revenue in GDP; and second, a negative (deflationary) output gap and a negative change (decrease) in the trend share of total income tax revenue in GDP. In the first case the discretionary increase in income tax revenue mitigates inflation and diminishes the risk of overheating of the economy. In the second case the discretionary decrease in income tax revenue combats deflation and contraction. In both cases, a positive correlation means a countercyclical of the discretionary government revenue policy.

The changes in the trend share of total income tax revenue in GDP result from the discretionary income tax policy of the government, while the output gap indicates the cyclical position of the economy.

The output gap has been calculated by the formula

$$Gap = (Actual\ GDP - Potential\ GDP) * 100 / Potential\ GDP \quad (1).$$

The potential GDP and the trend share of total income tax revenue in GDP have been obtained via the Hodrick–Prescott filter.

## **Bulgaria**

For Bulgaria, the calculated correlations between the output gap, on the one hand, and, the changes in the trend share of total income tax revenue in GDP, on the other hand, for the periods 1999-2007 (progressive income taxation) and 2008-2019 (proportional income taxation) are respectively 0.34 and -0.16. This means that discretionary changes in total income tax revenue were countercyclical in the period of progressive income taxation (1999-2007), but in the period of proportional income taxation (2008-2019) they were procyclical.

## **Hungary**

For Hungary, the calculated correlations between the output gap, on the one hand, and, the changes in the trend share of total income tax revenue in GDP, on the other hand, for the periods 1999-2010 (progressive income taxation) and 2011-2020 (proportional income taxation) are respectively 0.47 and 0.21. This means that discretionary changes in total income tax revenue were countercyclical in both periods (progressive income taxation from 1999 to 2010 and proportional income taxation from 2011 to 2020). However, under progressive income taxation discretionary income tax policy was more effective than under proportional income taxation since during 1999-2010 the changes in the trend share of total income tax revenue in GDP were accompanied by higher changes in the output gap than during 2011-2019.

## **Romania**

For Romania, the calculated correlations between the output gap, on the one hand, and, the changes in the trend share of total income tax revenue in GDP, on the other hand, for the periods 1995-2004 (progressive income taxation) and 2005-2020 (proportional

income taxation) are respectively -0.34 and -0.06. This means that discretionary changes in total income tax revenue were procyclical in both periods (progressive income taxation from 1995 to 2004 and proportional income taxation from 2005 to 2020).

### **Empirical assessment of the functioning of progressive income tax and proportional income tax in Bulgaria, Hungary and Romania as automatic stabilizers**

The empirical assessment of the functioning of progressive income tax and proportional income tax in Bulgaria, Hungary and Romania as automatic stabilizers has been made on basis of the correlation between the output gap and the change in the cyclical share of total income tax revenue in GDP. If this correlation is positive, the fiscal stabilizers function. If this correlation is negative, the fiscal stabilizers do not work. A positive correlation between the output gap and the change in the trend share of total income tax revenue in GDP may arise in two cases: first, a positive (inflationary) output gap and a positive change (increase) in the cyclical share of total income tax revenue in GDP; and second, a negative (deflationary) output gap and a negative change (decrease) in the cyclical share of total income tax revenue in GDP. In the first case the automatic increase in income tax revenue mitigates inflation and diminishes the risk of overheating of the economy. In the second case the automatic decrease in income tax revenue combats deflation and contraction. In both cases, a positive correlation means effective functioning of the automatic fiscal stabilizers. The changes in the cyclical shares of total income tax revenue in GDP are a result of the work of income taxes as automatic stabilizers, while the output gap indicates the cyclical position of the economy. The potential GDP and the cyclical share of total income tax revenue in GDP have been obtained via the Hodrick–Prescott filter.

#### **Bulgaria**

For Bulgaria, the calculated correlations between the output gap, on the one hand, and, the changes in the cyclical shares of total income tax revenue in GDP, on the other hand, for the periods 1999-2007 (progressive income taxation) and 2008-2019 (proportional income taxation) are respectively 0.17 and -0.28. This means that automatic changes in total income tax revenue were countercyclical under progressive income taxation (from 1997 to 2007) but procyclical under proportional income taxation (from 2008 to 2019). Hence, in Bulgaria progressive income tax automatically decreases the cyclical fluctuations of the economy but proportional income tax automatically increases these fluctuations.

#### **Hungary**

For Hungary, the calculated correlations between the output gap, on the one hand, and, the changes in the cyclical shares of total income tax revenue in GDP, on the other hand, for 1999-2010 (progressive income taxation) and 2011-2019 (proportional income taxation) are respectively 0.23 and 0.03. This means that automatic changes in total income tax revenue were countercyclical both under progressive income taxation (from 1997 to 2007) and under proportional income taxation (from 2008 to 2019). Hence, in Hungary both progressive income tax and proportional income tax automatically stabilize the economy but the former is a more effective automatic stabilizer than the latter.

#### **Romania**

For Romania, the calculated correlations between the output gap, on the one hand, and, the changes in the cyclical shares of total income tax revenue in GDP, on the other

hand, for 1995-2004 (progressive income taxation) and 2005-2020 (proportional income taxation) are respectively 0.13 and -0.06. This means that automatic changes in total income tax revenue were countercyclical under progressive income taxation (from 1995 to 2004) but procyclical under proportional income taxation (from 2005 to 2020). Hence, in Romania progressive income tax automatically mitigates the cyclical fluctuations of the economy but proportional income tax automatically raises cyclical volatility.

## Conclusion

The study results indicate that in Hungary discretionary and automatic changes in income tax revenue mitigate cyclical fluctuations under both progressive and proportional taxation but income tax discretion and automatic stabilizers are more effective under progressive taxation. In Bulgaria discretionary and automatic changes in income tax revenue increase business cycle volatility under proportional taxation but decrease it under progressive taxation. In Romania, discretionary changes in income tax revenue have procyclical effects under both progressive and proportional taxation but automatic changes in income tax are procyclical under proportional taxation countercyclical under progressive taxation. It may be concluded that in all three studied countries, income tax discretion and automatic stabilizers are more effective under progressive taxation is higher than under proportional taxation. From a business cycle perspective, it is recommended that Bulgaria, Hungary and Romania switch from proportional to progressive income taxation.

This paper contributes to existing knowledge in several ways: first, it introduces new measures of discretionary fiscal policy and automatic fiscal stabilizers, which are obtained by statistical filters; second, it investigates the relationship between the cyclical position of the economy, fiscal discretion and automatic fiscal stabilizers not by regressions but by correlations.

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