

The issue of public revenues' determinants in the Republic of Serbia

Pitanje determinanti javnih prihoda u Republici Srbiji

Branimir Kalas^{a*}, Vera Mirović^a, Miloš Pjanić^a

^a University of Novi Sad, Faculty of Economics in Subotica, Serbia

Article info

Original scientific paper/ Originalan naučni rad

Received/ Rukopis je primljen:
27 November, 2022
Revised/ Korigovan:
18 March, 2023
Accepted/ Prihvaćen:
1 April, 2023

DOI:
<https://doi.org/10.5937/bizinfo2301053K>

UDC/ UDK:
336.2:330.362(497.11)

Abstract

Policymakers should create a favourable macroeconomic framework to provide positive implications on public revenue collection. It implies designing a fiscal policy in the direction of generating the necessary revenues in order to achieve budget stability. Accordingly, identifying determinants that are crucial to generating higher revenues is an important challenge for every country. The aim of this paper is to identify how macroeconomic determinants affect the public revenues and which variable significantly improves public revenues. The subject of the paper includes an empirical analysis of the main macroeconomic variables and their implications on the public revenues level in the Republic of Serbia. The paper estimates the impact of selected explanatory variables such as gross domestic product, inflation, unemployment, export, public expenditures, total investment and population on public revenues in the Republic of Serbia from 2002 to 2020. The empirical findings confirmed macroeconomic framework significantly affects the public revenues for the observed period. The results of OLS model show that gross domestic product, export, public expenditure, total investment and population have a positive impact on public revenues. Conversely, inflation and unemployment negatively impact the public revenues in the analyzed period. The economic policy of the Republic of Serbia has to focus on a greater economic growth rate and export with an adequate level of public expenditures and total investment to ensure positive effects on the flows of the national economy.

Keywords: public revenues, macroeconomic determinants, OLS model, Republic of Serbia.

Sažetak

Kreatori politika treba da stvore povoljan makroekonomski okvir kako bi se obezbedile pozitivne implikacije na prikupljanje javnih prihoda. To podrazumeva dizajniranje fiskalne politike u pravcu generisanja neophodnih prihoda radi postizanja budžetske stabilnosti. Shodno tome, identifikovanje determinanti koje su ključne za generisanje većih prihoda predstavlja važan izazov za svaku zemlju. Cilj ovog rada je da utvrdi kako makroekonomske determinante utiču na javne prihode i koja varijabla značajno unapređuje javne prihode. Predmet rada podrazumeva empirijsku analizu ključnih makroekonomskih varijabli i njihove implikacije na nivo javnih prihoda u Republici Srbiji. Rad procenjuje uticaj odabranih eksplanatornih varijabli kao što su bruto domaći proizvod, inflacija, nezaposlenost, izvoz, javni rashodi, ukupne investicije i populacija na javne prihode u Republici Srbiji od 2002. do 2020. godine. Empirijski nalazi su potvrdili da makroekonomski okvir značajno utiče na javne prihode za posmatrani period. Rezultati OLS modela pokazuju da bruto domaći proizvod, izvoz, javni rashodi, ukupne investicije i populacija imaju značajan uticaj na javne rashode. Nasuprot tome, inflacija i nezaposlenost negativno utiču na javne prihode u analiziranom periodu. Ekonomska politika Republike Srbije mora biti usmerena na veću stopu privrednog rasta i izvoz uz adekvatan nivo javnih rashoda i ukupnih investicija, kako bi se osigurali pozitivne efekti na tokove nacionalne privrede.

Ključne reči: javni prihodi, makroekonomske determinante, OLS model, Republika Srbija.

*Corresponding author

E-mail address: branimir.kalas@ef.uns.ac.rs

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1. Introduction

The growing deficits and public debts of countries resulting from the global economic crisis determined the vulnerability of public finance sustainability (Tashevskaja et al., 2020). Simultaneously, as a consequence of COVID-19, government spending has increased significantly due to countries providing financial support for different sectors (Țibulcă, 2022). Namely, the COVID-19 pandemic, as well as the recession resulting from it, put enormous pressure on the state and its budgets (Gordon et al., 2020). Therefore, a well-determined revenue-expenditure relationship plays an important role in evading harmful results rising from unbalanced fiscal policy (Karakas and Turan, 2019). Taxation and economy are associated (Xing and Whaley, 2014), where economic conditions, growth rate and structure have an impact on revenue, growth rate and tax structure (Lin and Jia, 2019). Ferraro et al. (2020) argue that a primary issue is how taxes affect economic growth, while Fatehin and Sjoquist (2020) identify the relevance of tax policy implications on state economic growth. Over the past two decades, many economies have made a huge effort to change their tax systems to improve effectiveness and efficiency (Abshari et al., 2021). Bettering tax revenue represents a prerogative for many economies (Ndoricimpa, 2021).

Specifically, public revenues represent one of the most important issues for policymakers in terms of creating sustainable fiscal policy and budget. Gnanngnon and Brun (2019) point out that the mobilization of government revenues is still the main issue in the world. The state mostly generates public revenues through direct and indirect tax forms. These tax forms are very important for generating revenues and covering public needs, but also an appropriate macroeconomic framework is too essential for fiscal stability and sustainability. Government stability is an important source of advancing tax revenue (Hassan et al., 2021). Accordingly, governments need to generate adequate public revenues to finance their development needs (Gnanngnon, 2022). The revenue performance is often estimated by tax-gdp ratio and manifests the sufficiency of revenue collection in the country by the government (Neog and Gaur, 2021). According to mentioned, taxes is profiled as one of the most important variables in the macroeconomic framework. Kalaš et al. (2017) point out that taxes are essential for the government and their key role is collecting funds to cover public expenses. Similarly, Stoilova (2017) highlighted the character of taxation in terms of covering public expenses and contributing to economic stabilization and income distribution and allocation. Taxes are crucial policy tools that have a significant impact on macroeconomic outcomes (Andrejovska and Pulikova, 2018) and thus revenue levels should be adequate to cover public needs (Streimikiene et al., 2018). Namely, Jaén-García (2019) argues that optimal revenue to finance expenditures depends on relative costs. Gurdai et al. (2021) confirmed mentioned assertions that taxes are the key fiscal instrument to achieve economic growth. However, the creation of fiscal policy on economic growth can't be seen without deficit due to raising deficits and highlighted consumption implying that taxes will

have to increase in future (Michel, 2020). Finally, revenue collection is still a basic issue of macroeconomic policy in many states (Akitoby et al., 2019), where fiscal authorities must be capable to raise revenues to cover the expenditure to prosperously implement fiscal policy (Mawejje & Odhiambo, 2020).

The construction of the paper is as follows. After the introduction, there is a literature review related to earlier theoretical papers that have estimated tax revenue factors. The next part is a methodological framework which implies defined variables and developed hypotheses, as well as, the selected regression model. Furthermore, there is a descriptive analysis of public revenue determinants in the Republic of Serbia for the period 2002-2020. This part includes empirical findings and a regression model that confirm the significant effect of selected macroeconomic determinants on public revenues. The last segment compiles the obtained results with enabling information to policymakers in the Republic of Serbia in terms of which macroeconomic factors are relevant to public revenues. The novelty of the paper is manifested in the fact that this research expands the current theoretical opus and enables empirical findings related to influences of main macroeconomic determinants on public revenues. According to the authors' knowledge, this is the first research that investigates public revenues' determinants in the context of the macroeconomic framework of Republic of Serbia. Therefore, these empirical implications can be helpful for policymakers during the planning and defining public revenues in the future period.

2. Literature review

Many papers have investigated the relationship between macroeconomic determinants and tax revenues in the world (Loganathan et al. 2017; Andrejovská & Puliková, 2018; Arif and Rawat, 2018; Castañeda Rodríguez, 2018; McNabb, 2018; Terefe & Teera, 2018; Kalaš et al., 2020; Piancastelli & Thirlwall, 2020; Al-Qudah, 2021; Ihuarulam et al., 2021; Anastasiou et al., 2022; Nguyen-Phuong et al., 2022). According to Loganathan et al. (2017) their findings suggested that greater growth will have a positive impact on taxation in the sample of Asian countries for the period 1990-2104. When it comes to tax revenue determinants, Ali and Audi (2018) estimated tax revenues in Pakistan from 1975 to 2016 and their obtained findings of ARDL model confirmed the significant effect of inflation and unemployment. Ayenew (2016) analyzed determinants of tax revenues in Ethiopia for the period 1974-2013 and his results confirmed a significant impact of GDP per capita and inflation in the long-run. Terefe and Teera (2018) examined tax revenue determinants in East African countries from 1992 to 2015. Their analysis identified that gross domestic product per capita, trade openness, share of industry, share of agriculture have a positive effect on tax revenue in selected economies. Amoh and Adom (2017) found that foreign direct investment, manufacturing value added, services value added, external debt and government expenditures significantly influence the tax revenues in Ghana from 1975 to 2015. For example, Kalaš et al. (2020) examined the impact of macroeconomic

determinants on revenue level in the EU from 2006 to 2018. The empirical results confirmed the significant impact of GDP, inflation, unemployment, government expenditures, total investment and population on tax revenue in these economies for the observed period. Al-Qudah (2021) found a positive effect of GDPpc, government expenditure and fiscal deficit on tax revenues in Jordan for the period 1990-2019. Ihuarulam et al. (2021) investigated tax revenue determinants in ECOWAS countries from 2005 to 2019. Their empirical results confirmed significant impact of GDP, inflation and unemployment on tax revenue in the observed economies. Anastasiou et al. (2022) analyzed tax revenue determinants in 26 European states from 2015 to 2018 and their results identified a significant effect of gross domestic product per capita, public debt, government effectiveness, tax administration efficiency and tax rate on tax revenue collection. Also, Navarro-Galera et al. (2019) emphasize that population growth leads to higher expenditures that are not consistently encouraged by revenue growth. Contrary, Fujii (2017) indicates that large population size and high-income level create greater fiscal revenues, while Prowd and Kollie (2021) confirmed that tax revenues respond negatively to population growth in Liberia. Besides mentioned determinants, Nguyen-Phuong et al. (2022) highlighted that countries may have a positive association between tax revenue with broad money and human capital. According to discussed tax revenue determinants, this study specified the main macroeconomic determinants that could may significant implications for public revenues in the Republic of Serbia considering its economic structure and tax system.

3. Methodology and data

In order to provide information on which macroeconomic factors are significant for public revenues, the research has included chosen the most used variables such as gross domestic product, inflation, unemployment, export, public expenditures, total investment and population. Based on previous theoretical and empirical studies, the mentioned variables are selected. The paper analyzes annual data given by International Monetary Fund (IMF) for the period 2002-2020.

Table 1. Variable selection

Variable	Abbreviation	Calculation	Source
Dependent variable			
Public revenues	PR	% of GDP	IMF
Independent variables			
Gross domestic product	GDP	annual rate	IMF
Inflation	INF	annual rate	IMF
Unemployment	UNM	annual rate	IMF
Export	EXP	annual rate	IMF
Public expenditures	PE	% of GDP	IMF
Total investment	TI	% of GDP	IMF
Population	POP	total number	World Bank

Source: Authors illustration

The model includes selected explanatory variables according to previous empirical studies that have analyzed the impact of selected macroeconomic determinants such as GDP, inflation, unemployment, government expenditures, total investment and population (Andrejovska & Pulikova, 2018; Kalaš et al. 2020), inflation and unemployment (Ayenew, 2016; Ali & Audi, 2018), export (Bikas & Andruskaite, 2013; Plinkiene, 2016). The paper implies an ordinary least squares model where public revenues are determined as a dependent variable, while gross domestic product, inflation, unemployment, public expenditures, total investment and population are selected as independent variables.

Based on the defined research goal, the next hypotheses are developed:

H₀: Macroeconomic determinants significantly affect the public revenues in the Republic of Serbia.

H₁: GDP growth rate and export have a significant and positive effects on the public revenues in the Republic of Serbia.

H₂: Inflation and unemployment have a significant and negative effects on the public revenues in the Republic of Serbia.

H₃: Public expenditures and total investment have a significant and positive effects on public revenues in the Republic of Serbia.

H₄: Population growth has a significant and positive effect on the public revenues in the Republic of Serbia.

The model definition can be manifested as:

$$PR_t = \beta_0 + \beta_1 GDP_t + \beta_2 INF_t + \beta_3 UNM_t + \beta_4 EXP_t + \beta_5 PE_t + \beta_6 INV_t + \beta_7 POP_t + \dots + \epsilon_t \quad (1)$$

4. Empirical results and discussion

This segment of the study implies descriptive and empirical analysis with appropriate diagnostic tests to create a regression model. Firstly, there is a descriptive analysis that implies the average, standard deviation, minimum and maximum values of selected variables for the period 2002-2020.

Table 2. Descriptive statistics

Variables	Mean	Std. Dev.	Min.	Max.
PR	40.13	1.35	37.32	42.03
GDP	3.35	3.52	-2.73	10.15
INF	6.38	4.48	1.12	16.25
UNM	18.01	4.13	10.09	24.6
EXP	8.91	8.09	-5.83	29.19
PE	42.52	1.92	39.82	48.23
INV	21.32	3.59	16.52	29.86
POP	7232947	189547	6927000	7500000

Source: Authors calculation

The descriptive results show that the average share of public revenues was 40.13% which is less than the public expenditures share in GDP (42.52%). The economy of Serbia increased by 3.35% and registered mean inflation and unemployment rates of 6.38% and 18.01%, respectively. Furthermore, average export growth was

8.91%, while the mean share of total investment was 21.32% of GDP for the analyzed period.

Table 3. Multicollinearity test

Variable	VIF	1/VIF
GDP	6.17	0.1621
INF	5.19	0.1927
EXP	4.30	0.2324
POP	3.59	0.2784
INV	3.40	0.2941
UNM	2.24	0.4465
PE	2.13	0.4697
Mean VIF	3.86	

Source: Authors calculation

In order to provide an appropriate selection of explanatory variables, there is VIF test to check the potential problem of multicollinearity. Based on the mean VIF value (3.86), it can notice there is no collinearity between selected determinants.

Table 5. OLS modelling

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP	0.175 (0.000)							0.298 (0.000)
INF		-0.028 (0.705)						-0.174 (0.052)
UNM			-0.206 (0.004)					-0.106 (0.077)
EXP				0.005 (0.907)				0.105 (0.069)
PE					0.141 (0.012)			0.144 (0.007)
INV						0.246 (0.002)		0.054 (0.011)
POP							7.472 (0.669)	1.046 (0.018)
Prob > F	0.000	0.005	0.003	0.906	0.002	0.000	0.669	0.001
R-squared	0.207	0.186	0.395	0.008	0.413	0.427	0.011	0.7507

Source: Authors calculation

Table 5 includes several models that estimate the impact of preferred determinants on public revenues in the Republic of Serbia from 2002 to 2020.

From 1 to 7 models, it can see the individual effects of chosen variables on public revenues. The obtained results identified a significant impact of GDP, UNM, GE and INV, while that is not the case with other variables. However, there is the last model that implies the mutual impact of explanatory variables and it can see their significant effect on public revenues. It means that all variables are important for public revenues and can not be separately analyzed in terms of estimating the effect on public revenues. Precisely, the OLS model confirmed the positive impact of GDP, EXP, PE, INV and POP on public revenues, while INF and UNM negatively affect the public revenues for the observed period. Also, variables such as GDP and POP have the greatest impact on public revenues, where their growth of 1% enhances public revenues by 0.3% and 1.05%. The validity and reliability of the determined model are manifested in the higher value of R-squared (0.7507) and F value model (less than 0.001).

Table 4. Diagnostic tests

Breusch-Pagan test	
chi ₂ (1)	0.23
Prob > chi ₂	0.6336
Breusch-Godfrey test	
Df	1
Prob>F	0.9740
Ramsey Reset test	
F(3,8)	0.69
Prob > F	0.5858

Source: Authors calculation

After detecting no collinearity between explanatory variables, this research applies test heteroskedasticity, serial correlation and misspecification. Based on results from BP test and BPG test, there are no heteroskedasticity residuals and the existence of serial correlation. Finally, RR test denied the null hypothesis of model misspecification.

5. Conclusion

The issue of collected public revenues is very important for policymakers to enable an adequate level of financial sources to cover public expenditures and public needs. This topic gains particular importance in crisis conditions when countries face a fall in economic activity and a downward trend in collected revenues. The study has estimated the effect of macroeconomic determinants on public revenues in Serbia for the period 2002-2020. The empirical analysis includes main macroeconomic variables such as gross domestic product, inflation, unemployment, export, public expenditures, total investment and population. This research has confirmed that selected macroeconomic determinants significantly affect public revenues in the Republic of Serbia. It means that H_0 can be confirmed. Furthermore, the results have shown that GDP and EXP positively affect PR, which means that H_1 can be accepted. These empirical findings are in line with previous studies (Andrejovská and Puliková, 2018; Bikas and Andruskaite, 2013). Contrary, inflation and unemployment harm public revenues, thus H_2 can be accepted. The negative impact of inflation can be supported by the previous studies by Ayenew (2016),

and Ali and Audi (2018) and this is not the case with unemployment. However, empirical results highlighted that unemployment negatively affects public revenues, which can be considered logical. Namely, greater unemployment implies smaller public revenues due smaller economic growth and lower consumption. Having in mind that indirect taxes are the dominant tax forms in the Republic of Serbia, it can be emphasized that less consumption leads to less collected revenues. Likewise, the collected revenues from these taxes are significant for gross domestic product per capita in the Serbia in the long-run (Kalaš et al. 2020).

The obtained results have confirmed the positive effect of government expenditures, total investment and population which implies that H_3 and H_4 can be accepted. Looking at the character and intensity effect of explanatory variables, it can see that 1% growth of GDP and EXP enhances PR level by 0.3% and 0.10%, while the growth of INF and UNM reduces PR by 0.17% and 0.11%. Finally, an increase in PE, INV and POP leads to higher PR respectively for 0.14%, 0.05% and 1.04%. These findings can be supported by the previous empirical study of Kalaš et al. (2020) which identified the significance of gross domestic product, inflation, unemployment, government expenditures, total investment, and population for public revenues in the European Union. Given that Serbia's economy is predominantly oriented towards the EU market, these findings can be considered relatively reliable. The obtained empirical findings enable information to support and guidelines to policymakers in the Republic of Serbia about public revenue determinants. Additionally, the empirical results provide a better understanding significance of the macroeconomic framework in generating public revenues. Forthcoming research will be directed on Western Balkan countries and their comparison to provide the overall implications of the macroeconomic framework on public revenues in this area. The limitation of the research represents the absence of institutional determinants that may affect public revenues' level. It implies that analysis could include institutional and other non-economic factors such as political stability and government efficiency, as well as tax awareness, tax evasion. Therefore, the obtained findings can be partially considered and accepted in terms of the explanations of public revenues' determinants in the Republic of Serbia.

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