An Econometric Analysis of the Macroeconomic Determinants on Tax Revenue in Western Balkans

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Abstract: This study explores the macroeconomic determinants on tax revenue in Western Balkan countries between 2000-2021. The panel data set is collected from World Development Indicators provided by the World Bank database. The multiple regression analysisis used to explain the relationship between tax revenue as dependent variable and macroeconomic factors as independent variables. The results show that GDP growth, foreign direct investment, exports and remittances are positively related with tax revenue. The inflation rate and unemployment have negative impacton tax revenue. In addition, the net effect of each countryis measured by using the Least Squares Dummy Variable technique.

Keywords: tax revenue, GDP growth, multiple regression analysis,Western Balkans

1 Introduction

Taxation, tax revenue and topics related to them are widely explored and studied from different points of view, from country analysis to cross country comparison on timely basis. On Western Balkan countries context, there are few studies that include all the six countries that are included in this region. Since all these countries are working for a long time to fulfill the criteria and perform the reforms to be a member state of EU, we need to understand which are the drivers of tax revenue in order to estimate the most significant factors and in the same time to estimate the difference from EU member states.

Economic development will often generate additional needs for tax revenue to finance a rise in public spending, but at the same time it increases the countries' ability to raise revenue to meet these needs (Tanzi, Zee, 2001,IMF).

Taxation as an instrument plays a key role in the regulation of any economy, as well as its performing, as it serves as a tool of either increasing or decreasing money supply in the economy.

By this study we try to answer the following questions:

How does GDP growth and inflation rate impact on tax revenue in WB?

What is the impact of trade openness and unemployment on government revenue from taxation ? How does remmitances, FDI and curruption affect tax revenue in WB? These are the questions that this present study intends to answer by providing empirical evidence which could influence policy formation. The broad objective of this research is to examine how tax revenue is related to the key selected macroeconomic variables.

The rest of the study is as follows:section two relates to literature review on the recent studies on the evaluation impact of the macroeconomic factors on tax revenue; section three relates to data specification and description, model determination and results; section four relates to discussion and last conclusion and further research.

2 Literature review

GDP growth is expected to impact tax revenue positively (Andrasic et al.,2018; Kalas et al., 2017.2020;) They concluded that 1% increase enhances the GDP for 0.29% in OECD countries for the period 1996-2016. Moreover, Kalaset al.(2017) confirm correlation between tax and GDP growth rate in Serbia. Also their study (2020) for twenty-seven countries in the European Union for the period 2006-2018 shows that 1% increase of GDP enhances total tax revenue for 6.91%.

Inflation is expected to affect tax revenue negatively (Kalas et al., 2020). In their study for twenty-seven countries in the European Union for the period 2006-2018, they concluded that 1% increase on inflation rate causes lower level of tax revenue for 3.72%.

Unemployment is expected to impact tax revenue negatively(Kalas et al., 2020). In their study for twenty-seven countries in the European Union for the period 2006-2018, Kalas et al.(2020) concluded that 1% increase on unemplyment rate causes lower level of tax revenue for 0.001%. But Daveri and Tabellini (2000) concluded a positive nexus between tax and unemployment in Europe for the period 1965-1995.

Exports are expected to impact tax revenue positively while imports are expected to impact tax revenue positively.

The empirical evidence is mixed and FDI is expected to have a potential impact on tax revenue.Paun (2019) concluded that taxation contribute to the attraction of foreign direct investment in CEE countries for the period 2005-2015. Remittances are expected to impact on tax revenue positively. Corruption is expected to impact tax revenue negatively.

3 Data, model and methodology

The data analyses evaluate the tax revenue macroeconomic determinants for six Western Balkan countries: Albania, Bosnia and Herzegovina, North Macedonia, Kosovo, Montenegro, and Serbia, for the period 1993-2021. Because of some missing data, we use a total of 132 panel data observations, for the period 2000-2021.The data are based on World banka databases.

The study follows on examining the following hypothesis:

H1*:* GDP growth, don't have a significant impact on tax revenue.
H2:Inflation don't have a significant impact on tax revenue.
H3:Unemployment don't have a significant impact on tax revenue.
H4: Export don't have a significant impact on tax revenue.
H5: Import don't have a significant impact on tax revenue.
H6: FDI don't have a significant impact on tax revenue.
H7: Remittances don't have a significant impact on tax revenue.
H8: Corruption don't have a significant impact on tax revenue.

To verify the hypotheses raised this study we are dealing with a balanced panel date, because each country has the same number of observations and we use three methods: the pooled OLS, fixed effects, and random effects.

First, we write the pooled OLS regression, as:

$$txr_{it} = \beta_1 + \beta_2 gdp_{it} + \beta_3 inf_{it} + \beta_4 une_{it} + \beta_5 exp_{it} + \beta_6 imp_{it} + \beta_7 fdi_{it} + \beta_8 rem_{it} + \beta_9 corr_{it} + u_{it} \quad (1)$$

$$i = 1,2, \dots ,6$$

$$t = 1,2, \dots 10$$

Second, we continue with the fixed effects regression, as:

$$txr_{it} = \beta_{1i} + \beta_2 gdp_{it} + \beta_3 inf_{it} + \beta_4 une_{it} + \beta_5 exp_{it} + \beta_6 imp_{it} + \beta_7 fdi_{it} + \beta_8 rem_{it} + \beta_9 corr_{it} + u_{it} \quad (2)$$

$$i = 1,2, \dots ,6$$

$$t = 1,2, \dots 10$$

The subscript i on the intercept term suggests that the intercepts of the six countries may be different(Gujarati, 2009), due to special features of each country. We can show this by using the dummy variable technique, as:

$$txr_{it} = \alpha_1 + \alpha_2 d_{2i} + \alpha_3 d_{3i} + \alpha_4 d_{4i} + \alpha_5 d_{5i} + \alpha_6 d_{6i} + \beta_2 gdp_{it} + \beta_3 inf_{it} + \beta_4 une_{it} + \beta_5 exp_{it} + \beta_6 imp_{it} + \beta_7 fdi_{it} + \beta_8 rem_{it} + \beta_9 corr_{it} + u_{it} \quad (3)$$

where $d_{2i} = 1$ for country 2, 0 otherwise; $d_{2i} = 1$ for country 2, 0 otherwise; and so on. Albania is treating country 1 as the base category.

And finally, we write the random effects regression, as:

$$txr_{it} = \beta_{1i} + \beta_2 gdp_{it} + \beta_3 inf_{it} + \beta_4 une_{it} + \beta_5 exp_{it} + \beta_6 imp_{it} + \beta_7 fdi_{it} + \beta_8 rem_{it} + \beta_9 corr_{it} + u_{it} \quad (4)$$

whereβ_{1i} assumed to be a random variable with a mean value of β_1 (Gujarati, 2009), so the intercept value for an individual country can be expressed as:

$$\beta_{1i} = \beta_1 + \varepsilon_i$$

where ε_i is a random error term with a mean value of zero and a variance of σ_ε^2.

Inlation rate is calculated by the annual percentage change in CPI (consumer price index tha reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly)

Unemployment rate is measured as the ratio of unemployed individuals and total work force.

Export is measured by the ratio of exports and gross domestic product.

import indicator is measured by the ratio of imports and gross domestic product.

Dummy for country :d2i=if the observation belongs to Bosnia-Herzegovina, 0 otherwise; d3i=if the observation belongs to Kosova, 0 otherwise;d4i=if the observation belongs to Montenegro, 0 otherwise;d5i=if the observation belongs to North Macedonia, 0 otherwise;d6i=if the observation belongs to Serbia, 0 otherwise.Albania is a comparison country, and we can use six dummiesvariables(Gujarati 2003).

trx	tax revenue as a percentage of total GDP(%)
gdp	GDP Growth(%)
inf	inflation rate in percentage (%)
une	unemployment rate in percentage (%)
exp	export (annual growth %)
imp	import (annual growth %)
fdi	foreign direct investment(inflow/outflow % of GDP)
rem	remittances(% of GDP)
$corr$	corruption
d	country dummy

Table 1.
Variable Descriptions
Source: Authors' expanation

The dependent variable is tax revenue and the independent variables are macroeconomic determinants such as GDP growth, inflation, unemployment etc.

4 Results and Discussion

The following table is created using the data, to generate three different estimators of tax revenue equation, where standard errors are in parentheses below the coefficients:

Dependent variable: trx			
Independent variables	**Pooled OLS**	**Fixed Effects**	**Random Effects**
gdp	.007	.056	.054
	(.05)	(.046)	(.046)
inf	-.007**	-.080***	-.080***
	(.03)	(.029)	(.029)
une	-.097***	-.081***	-.079***
	(.02)	(.018)	(.018)
exp	.026**	.016*	.016*
	(.01)	(.009)	(.009)
imp	-.013	-.007	-.008
	(.015)	(.013)	(.013)
fdi**(inflow)**	.064**	.052*	.053*
	(.03)	(.030)	(.029)
rem	.089**	-.020	-.015
	(.03)	(.039)	(.039)
$corr$	.212	.244	.247
	(.267)	(.235)	(.234)
d2	3.723***		
	(.498)		
d3	6.609***		
	(.708)		
d4	5.419***		
	(.569)		
d5	2.709***		
	(.669)		
d6	5.438***		
	(.493)		
$constant$	16.608***	21.26***	21.18***
	(1.046)	(.976)	(1.482)
Observations	132	132	132
$R-squared$	.730	.790	
The quantities in parentheses below the estimates are the standard errors.			
*** p<.01, ** p<.05, * p<.1*			

Table 2.

Three Different Estimators of Tax Revenue Equation

Source: Authors' calculations

On the pooled regression model we observe that the model is statistically significant (F(13,118) = 24.63) and Adjusted-R2 = .70 indicating that 70% of dependent variable was explained by the independent variables of the model. The significant variables were, not surprisingly, inflation, unemployment, export, foreign direct investment, remittances and country.

The gross domestic product growth, import, and corruption were not significant variables in the model. Inflation measured by consumer price index negatively and significantly related with tax revenue in Western Balkans. A percentage increase in inflation, results in 0.077 percent of reduction in tax revenue; the increase in cost of living is associated with the loss of purchasing power of money, reducing real value of tax collected.
Unemployment also has negative and strongly significant impact on tax revenue. A 1% increase on unemployment rate reduce tax revenue by 0.097%.
Export has positive and strongly significant impact on tax revenue. A 1% increase on export reduce tax revenue by 0.026%.
Remittances also has positive and strongly significant impact on tax revenue. A 1% increase on unemployment rate reduce tax revenue by 0.09%.
Each country dummy variable also has positive and strongly significant impact on tax revenue.
The results of fixed and random effects models indicate that inflation ,unemployment, and export were significant variables, whereas other variables were not significant in explaining the tax revenue.
Hausman test is used to check which model between fixed and random effect is appropriate for interpretation. The probability of correlated random effects-Hausman test is 0.425, which is more than 5%, thereby we can not reject the null hypothesis and conclude that the fixed effects model is not appropriate.

Conclusions

In our paper, we used panel regression analysis to investigate on the relationship between tax revenue and macroeconomic determinantsfor a selection of Western Balkan countries including Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. The results of empirical research show that the sign and statistical significance of the coefficients(most of them) are correct and related with the theory. We find a positive and statistically significant result for the export, foreign direct investment and remittance's coefficients. While,for inflation and unemployment rate's coefficients we find negative and statistically significant results.
This study can be extended in a larger number of countries, dividing in subsamples new EU member states and WB country candidates for EU member to compare and evaluate further work on the path these countries must take.

References

[1] Andrašič, J., Kalaš, B., Mirović, V., Milenković, N., & Pjanić, M. (2018). Econometric modelling of tax impact on economic growth: Panel evidence from OECD countries. Economic Computation and Economic Cybernetics Studies and Research, 52(4), 211-226. http://doi.org/10.24818/18423264/52.4.18.14

[2] Castro, G. Á., & Ramírez Camarillo, D.B. (2014). Determinants of tax revenue in OECD countries over the period 2001-211. Contaduría y Administración, 59(3), pp. 35-59. http://doi.org/10.1016/S0186-1042(14)71265-3

[3] Daveri, F., &Tabellini, G. (2000). Unemployment, growth and taxation in industrial countries. Economic Policy, 15(30), 47-104.

[4] Kalaš, B., Milenković, I., Pjanić, M., Andrašić, J., &Milenkovć, N. (2017). The Impact of Tax Forms on Economic Growth – Evidence from Serbia. Industry, 45(2), pp. 113-125.

[5] Kalaš, B., Milenković, I., Pjanić, M., Andrašić, J., &Milenkovć, N. (2020). The Impact of Tax Forms on Economic Growth – Evidence from Serbia. Industry, 45(2), 113

[6] Paun, D. (2019). Tax competition and factors influencing the gross domestic product and foreign direct investments of CEE countries. Economic ResearchEkonomskaIstraživanja, 32(1), pp. 876–893. http://doi.org/10.1080/1331677x.2019.1585896

[7] Tanzi, V, Zee, H. 2001. “Tax Policy for developing countries” Economic Issue no 21, International Monetary Fund