

Taxation and environmental protection in the function of sustainable growth: the case of Serbia

Oporezivanje i zaštita životne sredine u funkciji održivog rasta: slučaj Srbije

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Abstract: The issue of environment protection has been increasingly topical in the world. Ecological taxation is an important tool for enhancing budget revenue collection, as well as, improving environmental protection. The presence of these taxes represents win-win solution for policymakers in terms of generating the necessary funds, but simultaneously protecting and reducing the negative implications of environmental pollution. The subject of the research is estimating relationship between environmental taxes and economic growth in Serbia from 2013 to 2021. The empirical findings confirmed that energy tax revenues, transport tax revenues and pollution tax revenues are significantly and positively correlated with economic growth measured by gross domestic product growth rate.

Keywords: environment, taxes, economic growth, Serbia.

Sažetak: Pitanje zaštite životne sredine postaje sve više aktuelno u svetu. Ekološko oporezivanja je važno sredstvo za povećanje naplate budžetskih prihoda, kao i za unapređenje zaštite životne sredine. Prisustvo ovih poreza predstavlja dobitno rešenje za kreatore politika u smislu generisanja potrebnih sredstava, ali istovremeno zaštite i smanjenja negativnih implikacija zagađenja životne sredine. Predmet istraživanja je procena odnosa između ekoloških poreza i ekonomskomg rasta u Srbiji od 2013. do 2021. godine. Empirijski nalazi su potvrdili da su prihodi od poreza na energiju, poreza na transport i poreza na zagađenje značajno i pozitivno korelisani sa ekonomskim rastom merenim putem stope rasta bruto domaćeg proizvoda.

Ključne reči: životna sredina, porezi, ekonomski rast, Srbija.

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INTRODUCTION

Sustainable development goals are one of the main targets to accomplish for many economies worldwide (Zhang and Zheng, 2022). The issue of green finance concept is recognized as a direction that has positioned among finance industry,

sustainable economic development and environmental protection (Anufrijev, 2022). Developing energy efficiency and reducing environmental concerns through environmental legal framework and green taxation are registered as the primary stimulating factors of climate change policy (Ahmed et al., 2022). The fulfillment of environmental taxat-

ion to internalize environmental externalities has been aimed for several decades in developed economies (Tan et al., 2022). A well-designed environmental taxes on the optimal level can reduce environmental problems and ecological imbalance (Esen et al., 2021). Thus, environmental taxes can be a very powerful tool to enhance public revenues and devote to the environment protection (Mirović et al. 2021), so these taxes can be used as effective sources to solve negative externalities (Wang and Yu, 2021). According to mentioned, environmental protection tax and green tax law popularize ecological development and growth (Yu et al. 2022). Environmental taxes are levies paid by environmental polluters or paid on goods that pollute the environment (Stojanović et al., 2022) and these taxes protect the environment by combating negative externalities (Karmaker et al., 2021). In fact, environmental taxes are recognized one of the most important fiscal policy tools used in the internalization of negative externalities (Ayding and Esen, 2018). Furthermore, green and pollution taxes promote technological innovation to fight climate change issues (Shahzad, 2020). Environmental taxes have an essential role in economies that applied environmental tax reforms (Miceikiene et al., 2016), and their role is manifested in changing behaviors (Freire-González and Puig-Ventosa, 2019).

Also, environmental taxes can be used as an energy tool to reduce carbon emissions and improving energy efficiency (Shi et al., 2019). For example, highlighted energy taxes as important factors of energy intensity and efficiency (Jimenez and Mercado, 2014; Filipović et al., 2015). Environmental taxes are pricing instruments applied to modify the energy consumption patterns and make a win-win solution for environment and economic growth (Bi et al., 2019; Gao et al., 2019; Bashir et al., 2022).

The structure of the research is as follows. After the introduction, there is a literature review where similar studies about environmental taxation and economic growth is presented. The third part is methodology and data which determines explanatory variables and develops hypotheses based on previous empirical studies. The fourth part is descriptive and empirical analysis of environmental taxes such as energy taxes, transport taxes and pollution taxes from the aspect of collecting revenues for the period 2013-2021. The last segment summarizes the given findings and conclusions with recommendations for future research.

1. LITERATURE REVIEW

The analysis of the drivers of revenue variations can enable necessary information to research the tax effect on economic and environmental conditions (Li and Masui, 2019). Environmental policy directly and positively affects economic performance by improving environmental conditions (Ignjatijević et al., 2020). The idea of using environmental taxes for the solve environmental problems dates back to Pigou (1920), and later to other similar studies such as (Goulder, 1995, Stern, 2007)

There are many papers that have investigated the nexus among economic growth and environmental taxes (Abdullah and Morley, 2014; Đurović Todorović et al., 2018; Mahmood and Ahmad, 2018; Andreoni, 2019; Busu and Trica, 2019; Hassan et al., 2020; Mirović et al., 2021). For example, Abdullah and Morley (2014) analyzed causality between economic growth and environmental taxes in EU countries for the period 1995-2006. Their results of panel causality analysis revealed long-run causality from economic growth to environmental taxes, as well as, short-run causality in the reverse direction. Đurović Todorović et al. (2018) investigated 12 countries in European Union (Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Serbia) for the period 2001-2016. Their results manifested that tax revenues growth from ecological taxes raises the state allocation in the field of environmental protection. Andreoni (2019) analyzed the relationship between environmental taxes and economic growth in twenty-five European countries from 2004 to 2016 and his results confirmed their positive relationship in the analyzed period. Hassan et al. (2020) researched 31 OECD countries for the period 1994-2013 in terms of aspect of environmental tax reforms and economic growth. Their empirical findings indicate that higher initial level of GDP per capital make preconditions that environmental taxes can more enhance economic growth

2. MATERIALS AND METHODS

The paper includes annual data obtained from Statistical Office of the Republic of Serbia for the observed period 2013-2021. Variable selection and definition is presented in Table 1.

Table 1 - Variable selection

Variables	Notation	Calculation
Gross domestic product	GDP	Annual growth rate
Energy tax revenues	ETR	Million RSD
Transport tax revenues	TTR	Million RSD
Pollution tax revenues	PTR	Million RSD

Based on empirical previous studies that estimated the relationship between environmental taxes and economic growth (Mahmood and Ahmad, 2018; Busu and Trica, 2019; Mirović et al., 2021) the next hypotheses are developed as:

H₁: Energy tax revenues are significantly correlated with GDP growth rate.

H₂: Transport tax revenues are significantly correlated with GDP growth rate.

H₃: Pollution tax revenues are significantly correlated with GDP growth rate.

After explanation of selected variables and presentation of developed hypotheses, there are descriptive and empirical results related to environment

taxation and economic growth in Serbia for the observed period.

3. RESULTS AND DISCUSSION

This part includes descriptive and empirical analysis of selected environmental tax variables such as energy tax revenues, transport tax revenues and pollution tax revenues, as well as, gross domestic product growth rate as a proxy for economic growth. Before we estimate their relationship for the observed period, it is necessary to determine the significance of these taxes in total environmental taxes' structure.

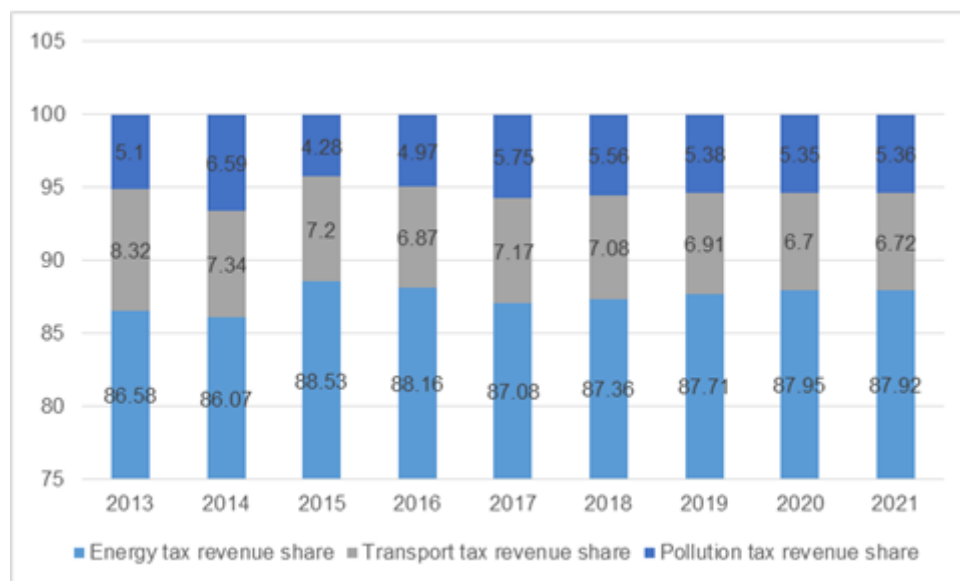


Figure 1 - Relative share of environment tax revenue

Based on obtained results, we can see that energy taxes mostly generate revenue in comparison of transport and pollution taxes. Precisely, the average share of energy tax revenues is 87.48% of total environmental taxes which is far more than mean relative share of transport tax revenues (7.15%) and pollution tax revenues (5.37%) for the analyzed period. These findings are in line with Randelović (2022) that indicate that environmental tax policy is focused on energy taxation and certain contribution of other environmental tax forms.

After identifying relative share of these taxes, the Figure 2 shows their percentage changes at annual base. This type of taxes had average growth of 9.92% for the observed period, while pollution tax revenues recorded the highest mean growth of 12.66%. Similarly, energy tax revenues and transport tax revenues registered average growth rates of 10.25% and 6.85%, which implies that these taxes contribute more and more to the budget of the Republic of Serbia. Analyzing the last year, energy tax revenues recorded the greatest growth of 10.25% compared to transport and pollution taxes that increased by 7.8% and 8.1% at annual level.

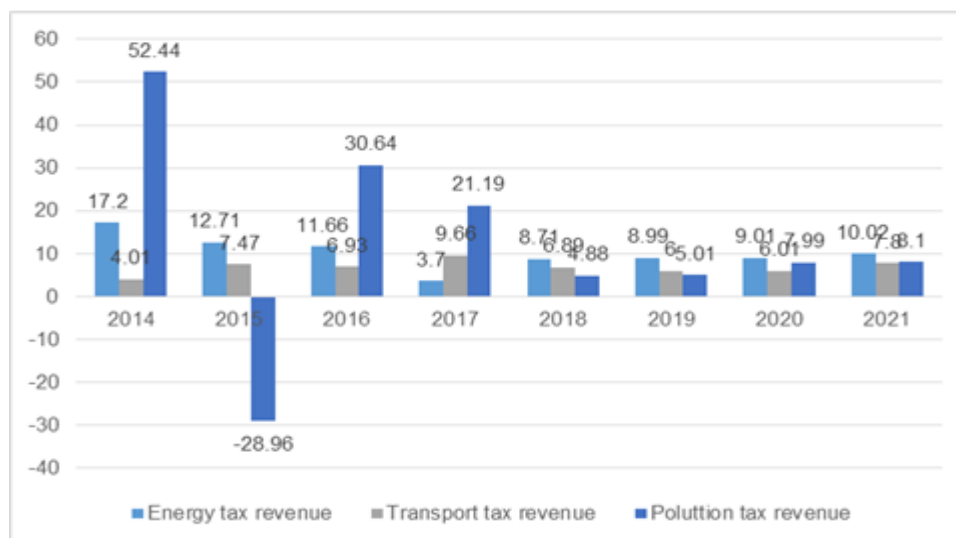


Figure 2 - Relative trend of environment tax revenue

Table 2 - Descriptive analysis

Variables	GDP	ETR	TTR	PTR
Mean	1.32	172110	13887	10551
Std. dev.	2.83	41614	2649	2700
Min.	-2.72	109691	10542	6459
Max.	4.39	238367	18255	14485

The obtained results of descriptive analysis show that economy of the Republic of Serbia increased by 1.32 at average level for the last eight years. Looking the revenue collection from envir-

onmental taxes, tax revenues were 172100 million RSD, transport tax revenues were 13887 million RSD, as well as, pollution tax revenues were 10551 million RSD at annual level. The results of correlation analysis is presented in Table 3.

Table 3 - Correlation matrix

Variables		GDP	ETR	TTR	PTR
GDP	Coeff.	1.000			
	Sig. (2-tailed)				
ETR	Coeff.	0.942	1.000		
	Sig. (2-tailed)	0.000			
TTR	Coeff.	0.968	0.978	1.000	
	Sig. (2-tailed)	0.000	0.000		
PTR	Coeff.	0.881	0.921	0.929	1.000
	Sig. (2-tailed)	0.001	0.000	0.000	

Based on empirical findings from correlation matrix, we can conclude that there is a statistically significant relationship between environmental taxes and economic growth measured by GDP growth rate in the Republic of Serbia.

The high values of correlation coefficients (values above 0.9) indicate very strong and positive correlation among selected variables, which means that greater level of collected revenues from these taxes have positive implications to economic growth in the Republic of Serbia.

CONCLUSION

The issue of environmental taxation is becoming an increasingly prevalent topic in the world. Policy-makers have to create favorable economic ambience for achieving greater GDP growth rates. It is necessary to more invest in environment-friendly projects to get positive effects on environment. Government taxes and budget are the key sources of financing green projects in Serbia (Knežević and Pavlović, 2020). Higher investment from the government, as well as, available European Union funds

can be helpful for improvement environment image of Serbia. The study analyzes the relationship between environmental taxation and economic growth in Serbia from 2013 to 2021. The environmental taxation is measured by collected revenues from energy, transport and pollution, while gross domestic product is a proxy for economic growth. The obtained results show that energy tax revenues averagely contributes to 87.48% of total environmental tax revenues, while transport tax revenues and pollution tax revenues have far less share of 7.15% and 5.37% in the observed period. Furthermore, environmental taxes had average growth rate of 9.92% which pollution tax registered the greatest mean growth rate of 12.66. The obtained results of correlation analysis confirmed a statistically significant and positive relationship among selected variable. The given correlation coefficients are above 0.9 which implies very strong correlation between environmental tax revenues and economic growth in the Serbia. Namely, the correlation coefficient for energy tax revenues and GDP is 0.94 which implies that hypothesis H_1 can be accepted. Also, the coefficients of correlation between transport tax revenues, pollution tax revenues and GDP are 0.96 and 0.88, so we can conclude that hypotheses H_2 and H_3 can be accepted. These findings indicate that government should focus on environmental taxation as one of the most used and lucrative tool for reducing negative effects of environmental pollution. Bearing in mind that environmental tax revenues are positively correlated with economic growth, policymakers should focus to stimulating economic activity in the field of environmental taxes. Higher revenue collection from environmental taxes will have positive effect on economic growth in Serbia. This research expands current theoretical opus related to environmental taxes and gives new empirical findings about this topic. The contribution of the conducted research is identifying the character and intensity of relationship among environmental taxation and economic growth in Serbia. In that way, the obtained findings provide information for policymakers about which environmental taxes are important for economic growth.

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REFERENCES

- [1] Abdullah, S., & Morley, B. (2014). Environmental taxes and economic growth: Evidence from panel causality tests. *Energy Economics*, 42, 27-33. <https://doi.org/10.1016/j.eneco.2013.11.013>
- [2] Ahmed, N., Sheikh, A.A., Hamid, Z., Senkus, P., Borda, R.C., Wysokinska-Senkus, A., Glabiszewski, W. (2022). Exploring the Causal Relationship among Green Taxes, Energy Intensity, and Energy Consumption in Nordic Countries: Dumitrescu and Hurlin Causality Approach. *Energies*, 15(4), 1-15. <https://doi.org/10.3390/en15145199>
- [3] Andreoni, V. (2019). Environmental taxes: Drivers behind the revenue collected. *Journal of Cleaner Production*, 221, 17-26. <https://doi.org/10.1016/j.jclepro.2019.02.216>
- [4] Anufrijev, A. (2022). Green finance and accounting approach support in the function of sustainable economic development. *Ecologica*, 29(107), 391-398. <https://doi.org/10.18485/ecologica.2022.29.107.13>
- [5] Aydin, C., & Esen, Ö. (2018). Reducing CO₂ emissions in the EU member states: Do environmental taxes work? *Journal of Environmental Planning and Management*, 61(13), 1-25. <https://doi.org/10.1080/09640568.2017.1395731>
- [6] Bashir, M.F., Benjiang, M.A., Bashir, M.A., Radulescu, M., Shahzad, U. (2022). Investigating the role of environmental taxes and regulations for renewable energy consumption: evidence from developed economies. *Economic Research – Ekonomska istraživanja*, 35(1), 1262-1284. <https://doi.org/10.1080/1331677X.2021.1962383>
- [7] Bi, H., Xiao, H., & Sun, K. (2019). The impact of carbon market and carbon tax on green growth pathway in China: A dynamic CGE model approach. *Emerging Markets Finance and Trade*, 55(6), 1312–1325. <https://doi.org/10.1080/1540496X.2018.1505609>
- [8] Busu, M., Trica, C.L. (2019). Sustainability of Circular Economy Indicators and Their Impact on Economic Growth of the European Union. *Sustainability*, 11(19), 1-13. <https://doi.org/10.3390/su11195481>
- [9] Đurović Todorović, J., Đorđević, M., Ristić, M. (2018). Environmental taxes as the instrument of environmental policy in developing countries. *Novi Ekonomist*, 12(2), 45-52. <https://doi.org/10.7251/NOE1824045T>
- [10] Esen, Ö., Yıldırım, D. Ç., & Yıldırım, S. (2021). Pollute less or tax more? Asymmetries in the EU environmental taxes – Ecological balance nexus. *Environmental Impact Assessment Review*, 91, 1-11. <https://doi.org/10.1016/j.eiar.2021.106662>
- [11] Filipović, S., Verbič, M., Radovanović, M. (2015). Determinants of energy intensity in the European

- Union: a panel data analysis. *Energy*, 92(3), 547-555. <https://doi.org/10.1016/j.energy.2015.07.011>
- [12] Freire-González, J., Puig-Ventosa, I. (2019). Reformulating taxes for an energy transition. *Energy Economics*, 78, 312-323. <https://doi.org/10.1016/j.eneco.2018.11.027>
- [13] Gao, X., Zheng, H., Zhang, Y., Golsanami, N. (2019). Tax Policy, Environmental Concern and Level of Emission Reduction. *Sustainability*, 11(4), 1-17. <https://doi.org/10.3390/su11041047>
- [14] Goulder, L. H. (1995). Environmental Taxation and the Double Dividend: A Reader's Guide. *International Tax and Public Finance*, 2(2), 157-183. <https://doi.org/10.1007/BF00877495>
- [15] Hassan, M., Oueslati, W., Rousselière, D. (2020). Environmental taxes, reforms and economic growth: An empirical analysis of panel data. *Economic Systems*, 44, 1-48. <https://doi.org/10.1016/j.ecosys.2020.100806>
- [16] Ignjatijević, S., Aničić, A., Vapa-Tankosić, J., Belokapić-Čavkunović, J. (2020). Determining relationship between economic growth and environmental protection. *Oditor*, 6(1), 38-48. <https://doi.org/10.5937/Oditor2001.0361>
- [17] Jimenez, R., Mercado, J. (2014). Energy intensity: A decomposition and counterfactual exercise for Latin American countries. *Energy Economics*, 42, 161-171. <https://doi.org/10.1016/j.eneco.2013.12.015>
- [18] Karmaker, S. C., Hosan, S., Chapman, A. J., & Saha, B. B. (2021). The role of environmental taxes on technological innovation. *Energy*, 232, 1-14. <https://doi.org/10.1016/j.energy.2021.121052>
- [19] Knežević, G., Pavlović, V. (2020). Environmental Tax Revenue and Expenditures in EU and Serbia – Lessons to be Learnt from Statistics. *Lex localis – Journal of Local Self-Government*, 18(3), 503-522. [https://doi.org/10.4335/18.3.503-522\(2020\)](https://doi.org/10.4335/18.3.503-522(2020))
- [20] Li, G., Masui, T. (2019). Assessing the impacts of China's environmental tax using a dynamic computable general equilibrium model. *Journal of Cleaner Production*, 208, 316-324. <https://doi.org/10.1016/j.jclepro.2018.10.016>
- [21] Mahmood, T., Ahmad, T. (2018). The relationship of energy intensity with economic growth: Evidence for European economies. *Energy Strategy Reviews*, 20, 90-98. <https://doi.org/10.1016/j.esr.2018.02.002>
- [22] Miceikiene, A., Makutenas, V., Zukovskis, J., & Kozuch, A. J. (2016). Comparative evaluation of experience in environmental tax reforms in Chosen EU States. *Problemy Ekorozwoju*, 12 (1), 87-99
- [23] Mirović, V., Kalaš, B., Milenković, N. (2021). Panel Cointegration Analysis of Total Environmental Taxes and Economic Growth. *Economic Analysis*, 54(1), 92-103. <https://doi.org/10.28934/ea.21.54.1.pp92-103>
- [24] Pigou, A. C. (1920). *The Economics of Welfare*. 4th edition 1938. London: Weidenfeld and Nicolson.
- [25] Ranđelović, S. (2022). Tax policy reform for sustainable economic growth in Serbia. *Ekonomika preduzeća*, 70(1-2), 101-112. <https://doi.org/10.5937/EKOPRE2202101R>
- [26] Shahzad, U. (2020). Environmental taxes, energy consumption, and environmental quality: Theoretical survey with policy implications. *Environmental Science and Pollution Research*, 27, 24848-24862. <https://doi.org/10.1007/s11356-020-08349-4>
- [27] Shi, H., Qiao, Y., Shao, X., & Wang, P. (2019). The effect of pollutant charges on economic and environmental performances: Evidence from Shandong Province in China. *Journal of Cleaner Production*, 232, 250-256. <https://doi.org/10.1016/j.jclepro.2019.05.272>
- [28] Stern, N. (2007). *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press
- [29] Stojanović, M., Becić, S., Stojanović, G. (2022). Participation of environmental taxes in government expenditures for environmental protection: The case of selected EU countries. *Bizinfo (Blace)*, 13(1), 11-18.
- [30] Tan, Z., Wu, Y., Gu, Y., Liu, T., Wang, W., Liu, X. (2022). An overview on implementation of environmental tax and related economic instruments in typical countries. *Journal of Cleaner Production*, 330, <https://doi.org/10.1016/j.jclepro.2021.129688>
- [31] Wang, Y., Yu, L. (2021). Can the current environmental tax rate promote green technology innovation? – Evidence from China's resource-based industries. *Journal of Cleaner Production*, 278, 1-12. <https://doi.org/10.1106/j.jclepro.2020.123443>
- [32] Yu, L., Gao, X., Lyu, J., Feng, Y., Zhang, S., Andlib, Z. (2022). Green growth and environmental sustainability in China: the role of environmental taxes. *Environmental Science and Pollution Research*, (to appear). <https://doi.org/10.1007/s11356-022-23355-4>
- [33] Zhang, Z., Zheng, Q. (2022). Sustainable development via environmental taxes and efficiency in energy: Evaluating trade adjusted carbon emissions. *Sustainable development*. (to appear). <https://doi.org/10.1002/sd.2400>
- [34] <https://www.stat.gov.rs/en-US/> available at: <https://data.stat.gov.rs/Home/Result/2503030201?languageCode=en-US>