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Governance of Environmental Challenges in Post-Pandemic Era discusses major changes in governance caused by recent turmoil due to the pandemic. The pandemic crisis was turbulent with high levels of uncertainties making planning and coordination hard to perform. Since a turbulent environment continues to exist after the pandemic, countries have to deal with them in the coming period, which makes the collection of papers relevant and useful.

Prof. Aleksandar Jović

The authors of the collection of papers used quantitative and qualitative research methods that resulted in firm conclusions. The issue of "new governance" in a turbulent environment characterized by uncertainty and high volatility will be even more relevant in the coming period, which is marked as an era of "policrisis". The publication would be useful to both scientists and policymakers since the topics explored are scientifically relevant and contemporary.

Prof. Željko Požega

The results of the scientific research presented in the publication can serve as a guide for policymakers in their efforts to improve the governance of sustainable development. The authors' recommendations provide a significant contribution to the design of regulations required for sustainable development. The publication is focused on topics that are scientifically based, innovative and internationally relevant.

Prof. Marija Topuzovska Latkovikj

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GOVERNANCE OF ENVIRONMENTAL CHALLENGES IN POST-PANDEMIC ERA

INSTITUTE OF SOCIAL SCIENCES

edited volumes

EDITORS: PREDRAG JOVANOVIĆ, NATAŠA DRVENKAR, BOJANA NAUMOVSKA

GOVERNANCE OF ENVIRONMENTAL CHALLENGES IN POST-PANDEMIC ERA

The collection of papers Governance of Environmental Challenges in Post-Pandemic Era deals with changes in governance caused by new conditions created in the pandemic era. Post-pandemic recovery period was marked by the emergence of new types of crises, such as the war in Ukraine and in the Middle East. To have successful environmental and more broadly sustainable development policies, countries need to adapt their governance models to the "new reality" marked by sudden pattern changes, high variability and unpredictability. The publication is divided into nine chapters. The authors of the papers analyze modern governance challenges and responses comprehensively, including both vertical and horizontal (sectorial) perspectives. In a constantly and rapidly changing environment where the only certainty is uncertainty, the publication provides a new and fresh perspective on governance in turbulent, post-pandemic conditions. It could be useful to scientists as a basis for further research of "polycrisis" circumstances as well as to policy-makers in designing new, more appropriate and more efficient governance models.

Predrag Jovanović
Nataša Drvenkar
Bojana Naumovska

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IN POST-PANDEMIC ERA

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ИНСТИТУТ ЗА СОЦИОЛОШКИ И ПОЛИТИЧКО ПРАВНИ ИСТРАЖУВАЊА

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Economic Development and Carbon Intensity: Evidence from the EU

Abstract

The adverse effects of greenhouse gases at the beginning of the XXI century raised concerns about the link between economic development and the environment. The paper examines the interdependence between GHG emissions (predominantly CO_2) per unit of GDP and the level of economic development (measured by GDP per capita). The authors test the causality between these two variables on a sample of EU-27 countries in the period 1990-2020. The authors examine whether the national economies go “from left to right” or vice versa “from right to left” on the Environmental Kuznets Curve (EKC). The paper applies the Granger causality test between two variables: GDP per capita and CO_2 per unit of GDP. The results of this paper present a guide for creators of public policies to improve the efficiency of their countries in the context of sustainable development.
Keywords: CO_2 emissions, Economic development, Environmental Kuznets Curve

Introduction

Climate change’s influence on the world economy and society is becoming increasingly visible. The expected climate change will cause many harmful consequences for society and its economic development. The warmer climate affects the health and life of people, agricultural and energy production, an increasing occurrence of forest fires, etc. On the other side, heavy rainfall causes floods and landslides. These adverse effects directly endanger human lives and property and the security of supply and access to food, water, and energy. Climate change significantly affects the society and economy of developed and developing countries’ various economic sectors and systems, so the need to adapt to changing climatic conditions and reduce greenhouse gas emissions

(GHG) should not be ignored. Creating economic policy should include those aspects because that is the only way to ensure economic and environmental sustainability and the economy's global competitiveness.

It should be understood that investing in environmental protection, improving the situation and reducing pressures on climate change, do not a priori imply slowing down of the economic growth. On the contrary, the EU example shows that it is possible to invest in the environment and reduce greenhouse gases' emissions expressed in CO_2 equivalent and simultaneously maintain economic growth. In 2018, EU countries had the lowest level of GHG emissions since 1990, reaching the reduction of 23% compared to the emissions from that year. In the same period, the EU-level GDP grew by 61%.

In the fight against climate change, the European Union plans to introduce a carbon tax as a classic import tariff (Rikalović & Molnar, 2017). According to the "EU Green Deal" from 2021, this tax will depend on the amount of carbon dioxide emitted in the entire production process and be applied to all products imported into the EU from third countries. As producers and exporters to the EU, developing countries will have high additional costs, so there is a danger that this tariff and old technologies will decrease their competitiveness significantly in the EU market. The paper aims to provide new quantitative and qualitative information that should enable the countries to achieve economic development without excessive threat to the environment and with the least possible use of production factors, but without worsening their competitive position in the European market. The results of this research could also serve as a guide in policymaking, with appropriate strategies to improve the economies' efficiency in sustainable development.

After the introduction and discussion of the connection between CO_2 emissions and economic growth in literature (both theoretical and empirical), the third part of the paper explains the methodology of data analysis. The fourth part of the paper analyses the obtained results, based on the econometric causality test between the level of economic development and carbon dioxide emissions. Finally, the fifth part contains the main conclusions and recommendations.

Climate Change Mitigation – The Role of the EU in the Global Context

Slowing down the process of global warming and developing the economic sector with a low level of GHG emissions are considered among the priority goals of the world economy. The answer in addressing climate change and attaining the defined goals is found in the term “global decarbonisation”, i.e. the worldwide transition to low-carbon development. The expected outcome is a reduced demand for fossil fuels and increased usage of renewable and other “green” energy sources and technologies in the future.

Human activities, such as burning fossil fuels, certain industrial processes, agriculture, deforestation, as well as decades of inadequate waste treatment, are the causes of rising concentrations of greenhouse gases in the atmosphere. The latest research by the International Panel on Climate Change has confirmed that human activity has caused the increase of about 1.0°C in the mean global temperatures, and the trend will continue with the minimum increase of 1.5°C between 2030 and 2052, compared to pre-Industrial Revolution values. The report from the same panel confirms that it is necessary to stop the rise of the mean global temperatures at 1.5°C by the end of the century. This rate of increase in the mean global temperature will allow adaptation to changing climate conditions, i.e. the survival of the world as we know it today. Otherwise, the global mean temperatures will rise by 2°C and more, and put the world economy in a completely uncertain situation in terms of the possibility to adapt to the changing climate conditions.

On the other hand, national analyses for Serbia show the temperature increase of 0.5°C to 1.5°C in the period from 1998 to 2017, while from 2008 to 2017, the average annual temperature rose by more than 1.5°C, and in some parts of Serbia, by more than 2°C. The territory of Serbia is warming faster than the world average. At the same time, the maximum increase by 1°C is expected from 2016 to 2035, 2°C from 2046 to 2065 and more than 4.3°C by the end of the century.

The United Nations recognised this problem in the early 1980s, as well as in 1992 and established the International Panel on Climate Change and the UN Framework Convention on Climate

Change (Convention), identifying the need for global action as the only possible solution. The Convention aims to stabilise GHG concentrations at a level that will not cause negative consequences for human life, economic development and natural resources on Earth. The Convention defines the goal but not the methods of achieving that goal. These are, for different periods, defined in protocols and agreements under the Convention, such as the Kyoto Protocol (for the period 2008–2012), the Doha Amendment to the Kyoto Protocol (2013–2020) and the Paris Agreement (2021–2030).

The Paris Agreement (adopted in 2015) significantly creates further economic development and establishes international relations. The Paris Agreement involves 189 member states, while the Convention includes 197, and its ratification at the national level implies committing to reducing GHG emissions. The Agreement's specificities include giving equal importance to adaptation to changing climate conditions and mitigation, i.e. reducing of GHG emissions, and introducing obligations to reduce GHG emissions for all Member States, regardless of the level of economic development. The previous protocols and the Convention distinguish between industrially developed countries, which are obligated to reduce GHG emissions, and developing countries (including Serbia), which do not have such an obligation.

The countries that have not ratified the Paris Agreement even four years after its adoption include Turkey and four other countries, significant oil exporters. In addition, it should be noted that the US, which, after China, is the second largest emitter of GHG in the world, has initiated the procedure of leaving the Agreement (which entered into force on 4 November 2020). The lack of membership in the Treaty is largely a political issue. It is encouraged preservation of certain industries and the employees thereof, and acknowledged the advantages that these countries had due to their oil and fossil fuel reserves. However, numerous activities, especially at the level of the US states, are being implemented and contribute to fulfilling the goals of the Paris Agreement.

The use of fossil fuels is a key generator of harmful gases that cause the greenhouse effect and lead to global climate change, which is why managing the growing global energy demand is called one of the key priorities (Petrović, Nikolić & Ostojić, 2017).

Combating climate change is a general development priority for the EU based on resource efficiency and attainment of the so-called carbon neutrality by 2050, which includes reducing GHG emissions by 50–55% by 2030, compared to 1990 levels. The EU has embarked on a path of modernisation and transformation of the member states' economies into climate-neutral ones. Here it should be noted that climate neutrality i.e. the total carbon footprint equalling zero, can mean achieving a balance between the emissions of carbon dioxide equivalent and the sinks of that gas (through the oceans and forests), while directly reducing its emissions to zero.

That reducing GHG emissions does not directly mean reducing the benefits for the economy is confirmed by the example of the EU. Between 1990 and 2018, the EU reduced its GHG emissions by 23%, followed by economic growth of 61%. Such a development framework, which is in line with the requirements of the Paris Agreement, was defined by the EU in the "European Green Deal", which was presented in late 2019. The mechanisms for achieving the objectives of the "European Green Deal" involve drafting the Law on Climate Change, which, according to the established deadlines, despite the situation caused by the COVID-19 pandemic, was presented by the European Commission on 4 March 2020.

It aims to support the efficient use of resources by moving to a clean, circular economy and mitigating climate change, revert biodiversity loss and cut pollution. All sectors of the economy, notably transport, energy, agriculture, buildings, and industries such as steel, cement, ICT, textiles and chemicals, are covered by this policy agenda. In July 2021, the "Fit for 55" plan further articulated the strategy and gave a draft to these transformative efforts. The "Fit for 55" creates a path for a green transition by using regulations, new initiatives, amendments to key legislation and key non-legislative communications. It touches on the EU goals of reducing net GHG emissions by at least 55% by 2030.

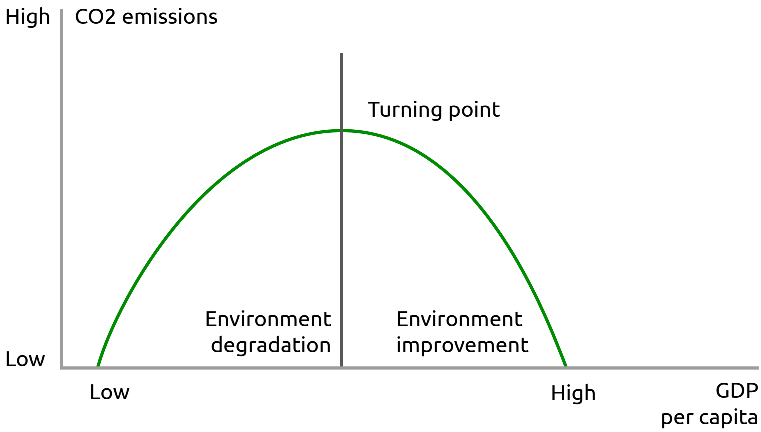
The EU will promote green growth strategies and implement ambitious environmental, climate and energy policies on that development path. The decision to set up a tax collection system in the way necessary to ensure the achievement of GHG emission reduction targets at the EU and global levels, clearly demonstrates such orientation. To prevent so-called carbon leakage, which involves moving production from EU countries to other countries and replacing EU products with cheaper ones, but with their production cycles involving higher total GHG emissions, the EU plans to introduce GHG taxes (carbon taxes) at the EU borders, under the World Trade Organization and other international agreements of which the EU is a member.

Literature Review

The relationship between economic growth and the environment has not been seriously critically during the very long period of development of economics as a science. However, the accelerated economic growth of the world economy at the end of the XX and the beginning of the XXI century (especially in developing countries) has led to increased concerns about the growing adverse effects of the greenhouse gases. Several different theoretical models have developed this connection, the most famous of which is the Environmental Kuznets Curve. This curve assumes a relationship between various indicators that measure environmental degradation and per capita income (Figure 1). In the initial phases of economic growth, ecological destruction increases and pollution grow. Still, after the level of per capita income (which is a turning point and varies depending on the indicator), the reverse trend begins. Increasing income levels enable economic growth to improve the environment. These consequences mean that each indicator that measures the impact on the environment is a function of per capita income in the form of an inverted U. From the aspect of the link between CO_2 emissions and economic growth, this would mean that the initial increase in GDP per capita is an increase in the CO_2 emission. However, as the economy moves from the predominantly industrial to the service-oriented one, the adverse effects of economic growth on the environment (damage) are gradually diminishing.

Illustratively speaking, the Kuznets curve in the previous figure initially describes the economy's transition from agricultural production in rural areas to industrial production in cities. As industrial production develops rapidly, it uses more energy, and as a result of burning fossil fuels, emissions of carbon dioxide, sulphur dioxide, and other greenhouse gases increase. However, as the

Figure 1. Kuznets environmental curve



Source: Adapted according to Stern (2004)

economy continues to develop, there is a transition from processing production to the development of service-oriented industries. Moreover, further economic growth leads to the introduction of newer and better technologies. At the same time, increased awareness of the importance of environment and the strengthening of adequate legislation and regulations in this area, lead to gradual reduction of environmental degradation.

Most research and scientific papers confirmed the link between CO_2 emissions and economic growth in the last two decades. Generally speaking, the authors concluded that since CO_2 emissions result from economic growth, reducing them may not be a desirable outcome. Furthermore, the link between these two quantities has significant implications for economic and environmental policy in a country.

Numerous analyses and research papers identified that economic growth has a disastrous impact due to pollution. Tao et al. (2008) analysed an inverted U-shaped link between economic growth and pollutants from 1985 to 2005 in China. The analysis of Franklin and Ruth (2012) for the USA over 200 years showed a continued upward trend in per capita CO_2 emissions connected to economic growth. Zhang and Wang (2013) explored the relationship between energy use, CO_2 emissions, and economic activity from 1995 to 2009 and concluded that economic growth positively impacts CO_2 emissions in China. Azam (2016) analysed the relationship between environmental degradation (CO_2 emissions) and economic growth and concluded that environmental damage harms economic growth. Ayobamiji & Kalmaz (2020) also found that the economic practices based on economic growth contribute to emissions of pollutants. Borhan, Ahmed and Hitam (2013) analysed the relationship between pollution and economic growth and concluded that the Environmental Kuznets Curve has existed in eight Asian countries. Teng et al. (2020) found that GDP increased CO_2 emissions for ten different OECD economies between 1985 and 2018. Ahmed et al. (2020) revealed that GDP positively impacts CO_2 emissions in G7 economies. Also, Ahmad et al. (2021), analysing the link between CO_2 emissions and economic growth in 26 OECD economies (time series 1990–2014), discovered a positive interaction between CO_2 emissions and economic growth. Fujii and Managi (2013) analysed the relationship between CO_2 emissions and economic growth in different industries from 1970 to 2005. They concluded that some industries, such as paper, wood and construction, had an inverted U-shaped relationship.

However, there is still no consensus in the literature concerning the relation between GDP and CO_2 emissions. For example, Aye and Edoja (2017) found a negative link between GDP and CO_2 emission in 31 developing countries, while Salahuddin et al. (2018) showed no association between CO_2 and real output. Ozcan (2013) concluded that the direction of causality was mixed for different countries. He tested this relation for 12 Middle East countries using panel data for the period 1990-2008. These results showed the evidence for a U-shaped curve for five countries, an inverted U-shaped curve for three countries and no causal link between income and CO_2 emissions for the other four countries. Analysing the case of Nigeria, Zubair et al. (2020) discovered that no causal link between CO_2 emissions and economic growth existed. Also, Petrović et al. in their research concluded that an increase in GDP per capita growth rate of 1% leads to an increased CO_2 emissions growth rate ranging between 1.10% and 1.15% (Petrović, Nikolić & Ostojić, 2018).

Research

To test for causality between GDP and CO_2 emission, we employed an econometric causality test on the panel with the procedure proposed by Dumitrescu and Hurlin (2012). To detect causality, we used data on carbon dioxide emissions as a by-product of the burning of fossil fuels and cement manufacturing. This data include the carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. CO_2 emission data is given as a ratio, compared to how many kilograms of CO_2 are produced per US dollar at 2015 prices. Our second variable is GDP per capita in constant 2015 US dollars. Both variables are taken in the original form from the World Bank's World Development Indicators database. When choosing the countries for the sample, we had to make a trade-off between the number of countries and the maximum length of data available for the selected countries. This trade-off resulted in a sample of 30 countries for which we could compose balanced panel series from 1995 to 2018, giving us 720 points of observation. Our sample represents countries of the EU plus the UK, Switzerland and Norway.

When testing for the causality between the variables, the typical approach in econometric literature is based on the Granger causality test for time series. A similar procedure can be performed with the panel data, keeping in mind that the model needs to include an optimum number of lags and that potential cross-sectional dependence must be addressed. Granger (1969) proposes a methodology for analysing the causal relationship between time series in his paper. If x_t and y_t are stationary series, then model:

$$y_t = a + \sum_{k=1}^{K} \gamma_k y_{t-k} + \sum_{k=1}^{K} \beta_k x_{t-k} + \varepsilon_t$$

can be used for testing whether x is causing y. The suggested model is testing whether the past values of x can predict the y from the present even if we include past values of y in the model. If this is the case, than we can conclude that x is causally influencing y. To confirm this, H_0 suggest that all β_k (for all k=1, …, K) equal to zero needs to be rejected. If there is no causality from x to y, same procedure can be repeated but with rotating places, so that we can test if there is causality from *y* to *x*. To use the same procedure for panel data, Dumitrescu and Hurlin (2012) modify the Granger model to:

$$y_{i,t} = a_i + \sum_{k=1}^{K} \gamma_{ik}\, y_{i,t-k} + \sum_{k=1}^{K} \beta_{ik}\, x_{i,t-k} + \varepsilon_{i,t}$$

where $x_{i,t}$ and $y_{i,t}$ are two stationary variables for the unit of observation *i* in the time period *t*. Selected lag order *K* is assumed to be identical for all individuals and the panel must be balanced.

After performing the suggested regression, the next step is to perform *F* test on the *K* linear hypotheses that are testing whether the coefficient β_{ik} is equal to zero (for all k=1,…,K). From here, individual Wald statistic *Wi*, can be derived, which will be used for the calculation of the average Wald statistic $\overline{W}$. Under the assumption that the Wald statistics are independently and identically distributed across individuals, standardised statistic $\bar{Z}$ will follow a standard normal distribution when $T \rightarrow \infty$ and $N \rightarrow \infty$.

$$\bar{Z} = \sqrt{\frac{N}{2K}} \times (\overline{W} - K) \xrightarrow[T,N\rightarrow\infty]{d} N(0,1)$$

In cases with fixed time dimension T if T>5+3K, the approximated standardised statistic $\tilde{Z}$ will follow the standard normal distribution.

$$\tilde{Z} = \sqrt{\frac{N}{2K} \times \frac{T-3K-5}{T-2K-3}} \times (\frac{T-3K-3}{T-3K-1} \times \overline{W} - K) \xrightarrow[T,N\rightarrow\infty]{d} N(0,1)$$

If the values of these statistics are larger than standard critical values, the null hypothesis of no Granger causality should be rejected. With large N and T in the sample, $\bar{Z}$ should be used for testing hypothesis, while for large N but relatively small T, one should use $\tilde{Z}$. An optimal number of lags can be chosen in line with the prior researcher's knowledge or by consulting one of the three information criteria (AIC/BIC/HQIC). To deal with the potential presence of cross-sectional dependence, Dumitrescu and Hurlin (2012) suggested a bootstrap procedure to compute critical values for $\bar{Z}$ and $\tilde{Z}$ instead of asymptotic critical values.

As the presented procedure suggests, we performed the stationarity test for our variables in the first step. As the cross-sectional dependency can be an issue for the panel unit root test of the first generation, besides Im-Pesaran-Shin test, we also implemented the Pesaran second-generation unit root test CIPS. Results of the first-generation unit root tests presented in the column two and three of Table 1 suggest that series are stationary in levels, since null hypothesis that all panels contain a unit root is rejected due to p-values being below 0.05 regardless of the information criteria being used for the choice of the optimal lag. Nevertheless, second-generation Pesaran CIPS test that considers the presence of the cross-sectional dependency suggests that the series of GDPpc have one unit root, since the null hypothesis of non-stationarity cannot be rejected due to the high p-value. This is confirmed by testing the stationarity of the first difference of this series, for which the null hypothesis is now rejected.

Table 1. Unit root test statistics

	IPS		CIPS		
	CO_2	**GDPpc**	**CO_2**	**GDPpc**	**d.GDPpc**
W-t-bar (AIC)	0.9486	0.9926			
W-t-bar (BIC)	0.9303	0.9874			
W-t-bar (HQIC)	0.8972	0.9907			
Zt-bar			-3.385***	-2.528	-13.253***

*,**,***, represent the level of statistical significance at 10%, 5% and 1%
Source: Authors' calculation

We continue the procedure for testing the causality with our series of GPDpc transformed in the first differences. Using the same approach of considering all three information criteria for the optimal lag structure and calculating $\bar{Z}$, we present the results in columns two and three of Table 2. As can be seen, calculated values of Z-bar statistics for AIC and HQIC criteria of optimal lag structure suggest that H0 should be rejected, which would mean that economic growth does increase the level of CO_2 emission. Despite this, Z-bar test statistics with BIC choice of optimal lag structure has p-value much higher than in the other two cases, which means that we cannot reject H0 of no causality from growth to higher C02 emission. Since we have no definitive confirmation, we continue with the bootstrap procedure to control for the possibility of cross-sectional dependency in the data. Results of the Z-bar statistics obtained after 500 replications are presented in columns four and five of Table 2. Values of the Z-bar statistics in all three cases suggest that controlling for the protentional presence of cross-sectional dependence, we cannot reject null hypothesis that economic growth does not cause an increase in CO_2 emissions.

Table 2. Test statistics

	Original data		Computed using 500 bootstrap replications	
	Z-bar	p-value	Z-bar	p-value
AIC	5.0485	0.0000	5.0485	0.2260
BIC	0.5596	0.5757	0.5596	0.6600
HQIC	5.0485	0.0000	5.0485	0.2240

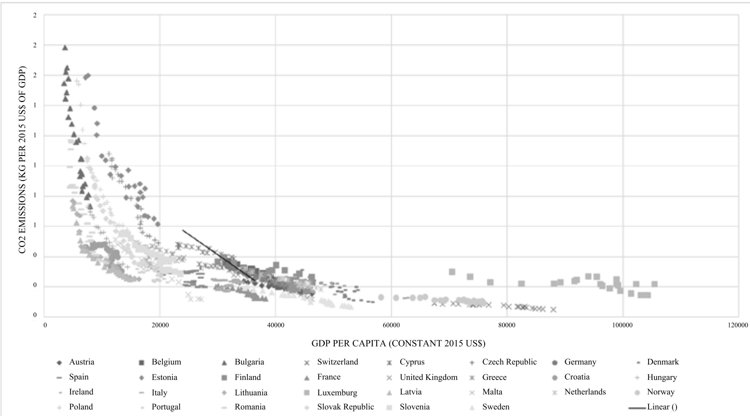
H0: GDP p.c. does not Granger-cause CO2 emission per $ GDP
H1: GDP p.c. does Granger-cause CO2 emissions per $ GDP for at least one country in the panel
Source: Authors’ calculation

Discussion

The results we have obtained are not unequivocal. One possible reason is that the sample is not homogeneous in terms of carbon intensity.

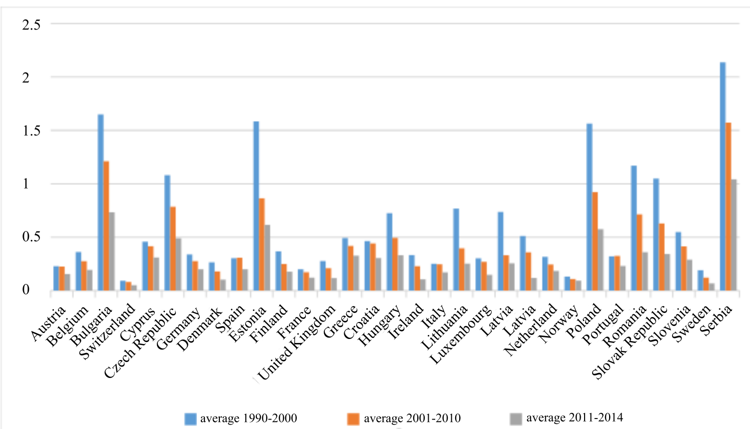
Although the scatter plot confirms the negative correlation (see the linear trend needed in Graph 2), the fact is that the econometric procedure for testing/investigating causality between the observed variables did not confirm it. Graph 3 presents the carbon intensity of the economies of EU member states and other selected countries.

Figure 2. Interdependence between CO_2 emission and level of economic development: EU member countries



Source: Authors' calculation and presentation using Stata

Figure 3. CO_2 emissions (kg per 2015 US$ of GDP), selected countries 1990–2014



Source: Authors' calculation based on the World Bank database: https://data.worldbank.org/indicator/EN.ATM.CO2E.KD.GD (access: 3. 3. 2022)

It can be seen that the EU is not homogeneous concerning this issue, i.e. that EU countries are very different when it comes to the amount of carbon dioxide emissions per unit of GDP.

In all three observed sub-intervals (1990-2000; 2001-2010; and 2011-2014), the former transition countries stand out as having the highest amount of carbon dioxide emissions per unit of GDP. These are Bulgaria, Czech Republic, Slovakia, Estonia, Romania and Poland. If we compare the situation in Serbia, we come to the conclusion that the situation in our country is worrying. Although all countries recorded a decline in the amount emitted in the period after 1990, in parallel with the achieved economic development (i.e. GDP per capita growth), the countries in the sample differ significantly in the carbon intensity of GDP unit.

The obtained results represent a good starting point for new research in this field. In order to determine the interdependence in the EU between the level of economic development and carbon dioxide emissions, one of the possible directions for further testing is to separate the more developed EU countries (EU-15; "old Europe") and less developed countries (EU-12; "new Europe"). It is possible that those countries that are at a similar level of economic development reflect the interdependence between the observed variables. Also, some other eco-control variables should be included in the next iterations, such as the presence of renewable energy sources in the national energy mix and the like.

Conclusions

In December 2018, the European Commission proposed the European Green Deal for the European Union and its citizens. This commitment represents a new growth strategy to transform European Union countries into just and prosperous societies with a modern, efficient and competitive economy, separate from the use of resources to become carbon neutral by 2050. The European Green Deal Agreement (with key policies and measures to achieve the set goals) is today an integral part of the European Commission's strategy to implement the United Nations Sustainable Development Agenda until 2030 and the Sustainable Development Goals. European Union member states are obliged to harmonise their national policies with new development strategies and public policies. In the period from 2014 to December 2018, 14 out of 28 countries developed either a strategy or a roadmap or action plans for the transition to a green economy (Mitrović & Jandrić, 2021).

One of the basic conclusions of this paper is that future economic growth and development must take place in compliance with environmental standards imposed by the fight against climate change. By applying the "Green Deal", the EU plans to introduce a carbon tax as an import tax. The essence of the import tax is the difference in GHG emissions that occur during the production of a good in a non-EU country (Serbia) (by using dirty energy sources and low energy efficiency technology), and those emissions that arose from the production of the same good in the EU country. It means that for all the products from Serbia for which low-calorie and lower quality coal is used in production, the producer or importer in the EU will have higher additional costs. The possible consequence of this would be the lower Serbian competitiveness in the EU market (Mitrović & Veselinov, 2018).

The countries on the way to the EU membership (among which is Serbia) face requirements that need to be implemented, arising from numerous chapters. This also applies to Chapter 27, which deals with the environment. Environmental policy is based on preventive activities, combating environmental hazards at their source, sharing responsibilities and integrating environmental issues into other EU policies. Policies and requirements related to environmental issues must be integrated into the process of creating and implementing all other EU policies and activities, primarily in terms of promoting the principles of sustainable development. The main instruments in the fight against climate change are decarbonisation, growth of energy efficiency and wider application / greater use of renewable energy sources (RES).

Decarbonisation means reducing the use of fossil fuels and increasing the EU's energy independence. The basic principle of the EU's environmental policy is the suppression of pollution at its source, based on the principle that "the polluter pays". The policy of combating climate change has been accompanied by the improvement of standards related to industry work, especially sectors that are a significant source of pollution. This approach to policymaking and implementation and the associated costs are a particular challenge for countries preparing for membership, such as Serbia (Vujačić et al, 2020).

In Serbia, modest progress has been made in the area of environmental protection and the field of climate change issues. However, it is necessary for Serbia to strengthen administrative capacities and strategic planning, and increase investments in connection with the priorities necessary for further harmonisation with EU policies (Rikalović et al, 2022).

Outcomes of this research have aided us in embracing the promotion of energy intensity diversification in Serbia. It can be seen and clearly noticed from Graph 3 that the situation in Serbia is very unfavourable in this regard in all the observed time intervals.

This could be achieved by implementing a more ambitious green energy initiative that will maintain the nation's economic momentum. The design and execution of successful policies to regulate Serbian energy and manufacturing sector practices will improve its sustainable growth. It will additionally regulate the CO_2 pollution levels of the nation if the government sets emission restrictions on the companies and factories that are emitting CO_2 emissions. The threat of punitive action or high taxes on infringers of this policy will deter environmental pollution. Also, energy usage should be embraced by incorporating sustainable (renewable) energy sources, including hydropower, oceanic, and wind energy sources.

Furthermore, Serbia should be careful when formulating policies that will stimulate economic growth at the expense of environmental degradation. Implementing the policies mentioned above will help maintain sustainable economic development and Serbia's proven environmental performance. This study's outcome could also be positive. Further studies can be conducted for other emerging nations while considering asymmetry in econometrics modelling or the use of micro-disaggregated data. Furthermore, other studies can account for other drivers of growth that have not been explored in this study.

Better law enforcement and strengthening inspections should lead to elimination of the existing inconsistencies and shortcomings in the field of legislation, which prevent better and more effective enforcement of regulations (Arsić, Ranđelović & Tanasković, 2016). The European Union, in its report, also emphasises the need to strengthen judicial and environmental inspection capacity. In principle, more serious work has begun on priorities in the areas of environment and climate change because the EU requires readiness from future member states to implement the prescribed obligations. The Emissions Trading Directive is a key instrument for reducing greenhouse gas emissions. The climate-energy package includes a comprehensive revision of this Directive as well as the strengthening of the legislation underlying the emissions trading scheme. Major changes include the introduction of a single emission limit at the EU level instead of previous national limits.

The emissions trading system includes all combustion processes exceeding 20 MW, where it is not relevant whether they produce heat or electricity for sale or their own needs. According to the Renewable Energy Directive, Member States adopt binding national targets for increasing the share of renewable energy sources in their energy consumption. These targets also reduce greenhouse gas emissions and reduce the EU's dependence on energy imports. We should keep in mind the importance of the development of renewable energy markets, their positive impact on regional and local development opportunities, and the development of new generations of technologies in this area.

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