Tkacova, A., Gavurova, B., and Maslisova, M. (2023). The size of government and economic growth in EU countries. *Administratie si Management Public*, 40, 7-22. DOI: https://doi.org/10.24818/amp/2023.40-01

The size of government and economic growth in EU countries

Andrea TKACOVA[1], Beata GAVUROVA[2], Maria MASLISOVA[3]

Abstract: The relationship between the public sector size and economic growth is the subject of many discussions. Momentarily, the four elementary streams are defined, while the resulting impact depends on the monitored sample of the countries and the employed methodology. The aim of the paper was to identify the impact of the public sector size on the economic growth of the 27 EU countries in the period 1996 to 2021. The public sector size was quantified using four different variables as total public expenditure, total public revenue, tax revenue and final government consumption. Through panel regression, the negative impact of the public sector size on the economic growth of the EU countries was demonstrated in all four models, while the most significant negative impact was reached by the final government consumption. The significant negative impact of the crisis presence on the economic growth of the EU countries was also demonstrated. The EU countries should focus their activities there to diminish the public sector growth and to manage the structure of the government expenditures from the current to capital expenditures of an investment characteristic.

Keywords: size of government, economic growth, public expenditure, panel regression.

JEL: H20, H50, O40

DOI: https://doi.org/10.24818/amp/2023.40-01

Introduction

The public sector plays an important role in the public goods provision, fair redistribution of wealth, as well as in the stabilisation processes in the economy. Nevertheless, the public sector size is disputable and it has been the subject of research by economists for several decades. The priority is to identify the

[1] PhD., Technical University of Kosice, Faculty of Economics, B. Němcovej 32, Košice, Slovakia, e-mail: andrea.tkacova@tuke.sk. ORCID: 0000-0002-6025-1261

[2] Professor PhD., Faculty of Management and Economics, Tomas Bata University in Zlin, Mostni 5139, 760 01 Zlin, Czech Republic, e-mail: gavurova@utb.cz. ORCID: 0000-0002-0606-879X

[3] Ing., Technical University of Kosice, Faculty of Economics, B. Němcovej 32, Kosice, Slovakia, e-mail: maria.maslisova@student.tuke.sk. ORCID: 0009-0008-3569-1119

relationship between the public sector size and economic growth as well as to determine the optimal size of the public sector. The government size is critical to the development of the economy, as the changes made in government growth can affect the changes in the economy (Cooper, 2020). The public sector is crucial in the areas such as infrastructure, education, and health as these sectors cannot be provided fully by the private sector at a societal level. Thus, government interventions lead to higher economic growth in these areas as confirmed by studies such as by Bose et al., (2007), Romero-Ávila and Strauch, (2008), and Ghose and Das (2013). On the other hand, the government cannot increase its position by raising taxes that change consumer behaviour and thus, they can distort the market just to cover the need for increased government spending. Centralisation and bureaucracy, which are associated with public sector growth, reduce creativity in the private and public sectors and thus, they lead to inefficiency simultaneously (Romero-Ávila & Strauch, 2008; Afonso & Furceri, 2010). Above all, these are the cases where innovations are absent (Chobanov & Mladenova (2009).

Therefore, government activities can play both positive and negative roles in economic growth. The final effect of government spending on economic growth depends on a number of the factors, such as the amount and the type of spending (Bouakez et al., 2016; Facchini & Seghezza, 2018; Divino et al., 2020). Actually, a large increase in government spending leads to an increase in the negative effects that can cause a nonlinear relationship between government size and economic growth. In such cases, the positive effects of government spending can be reversed (Kosempel, 2004; Agénor, 2010; Bove, 2017).

The EU countries have recently been under pressure to increase public spending due to the Covid 19 pandemic and the war in Ukraine. In the past, it was the crisis in 2008 and the successive problems of the enormous indebtedness of the European countries. All these events had a significant impact on the state of public finances in the countries and the ability of the public sector to participate in economic growth generation. The aim of this study is to identify the impact of the public sector size on the economic growth of the EU countries for the period 1996 to 2021. For a majority of the studies, the public sector size is quantified as the share of public expenditure in the country‘s gross domestic product. The presented study provides an expanded view of the public sector size, which is also defined through the indicators such as final government consumption, tax revenues, and public revenues as a percentage of gross domestic product.

1. Theoretical background

The investigation of the relationship between the public sector size and economic growth has become the subject of discussions thanks to Wagner's law which places importance on economic growth as a driving force of the government size (Wagner, 1958). The fundamental point of the discussion is the causal relationship between the variables primarily. Momentarily, we can define four basic approaches to this issue (Nyasha & Odhiambo, 2019). The first is the Keynesian view claiming that the

government size affects economic growth and not vice versa (Loizides & Vamvoukas, 2005; Ebaidalla, 2013). Its opposite is Wagner's law, which the government is inefficient in the provision of services according to. Therefore, it cannot manage economic growth. Instead, it is economic growth that propels government size increases as the government responds to the demand placed on it by the growing economy (Samudram et al., 2009; Thabane & Lebina, 2016). The third view is known as a feedback response that talks about the mutual influence of the variables (Abu-Eideh, 2015; Wu et al. 2010). The fourth and least popular is a so-called neutral view that sees these two phenomena as mutually independent (Taban, 2010).

From the above-mentioned lines, it follows that there is indeed a significant debate about the impact of the public sector size on economic growth. This is also confirmed by the overview of the results of the following empirical studies that analyse this issue at a level of the European countries.

Bergh and Karlsson (2009) investigated the effect of the public sector size on the economic growth of the OECD countries for the periods 1970 to 1995 and 1970 to 2005 employing the panel regression. The public sector size was expressed as a proportion of total government expenditure or total tax revenue to gross domestic product. The authors conclude that there is a strong negative effect of taxes on economic growth in the period 1970 to 1995. Trade freedom is positively related to the growth in the period 1970 to 2005. The negative relationship between the public sector size and economic growth is kept even when managing economic freedom and globalisation.

Afonso and Furceri (2010) investigated an issue employing the panel regression in the period 1970 to 2004 in the OECD and EU countries. They concluded that total income and total expenditure negatively affect gross domestic product per capita in both OECD and EU countries. The indirect taxes and the social contributions are the most harmful to economic growth in terms of both size and volatility. The transfers possess a positive and significant impact only in the EU countries.

Zimčík (2016) examined the OECD countries for the period 1995 to 2004 applying the panel regression based on the fixed effects. The main result of his study is the finding of a negative correlation between public sector growth and gross domestic product growth. Further increases in public spending may negatively affect long-term economic growth.

d'Agostino, Dunne and Pieroni (2016) focused on the 106 countries of the world and the period 1996 to 2010. Applying the GMM method, they concluded that government investment spending increases economic growth, while current government spending and the high levels of corruption have a negative impact on gross domestic product.

Lupu and Asandului (2017) analysed the eight Eastern European countries in the labour market for the period 1995 to 2014 through the autoregressive distributed lag method. According to them, the optimal level of government spending is between 37 % and 41 % and the current level is higher for Bulgaria, Hungary, and Romania.

Hajamini and Ali Falahi (2018) examined the 14 EU countries from 1995 to 2014 through the threshold. They found that current spending negatively affects economic growth. The optimal level of expenditure on final consumption is estimated at a value of 16.6 % and the optimal level of expenditure on fixed capital formation was calculated at a value of 2.3 %.

Gurdal et al. (2021) focused on the G7 countries in the period 1980 to 2016. Employing the unit root test, the cointegration test, and the panel causality test, they showed there is a bidirectional causality between economic growth and government spending. There is no causality between economic growth and tax revenue.

While in the case of the European countries, the negative impact of the public sector size on economic growth is most often proven that corresponds to the Keynesian view, in the case of another sample of the countries, the outcomes are no longer uniform. An instance is a study by Selvanathan et al. (2021), who examined Sri Lanka in the period 1995 to 2016 employing the autoregressive distributed lag method. The result is a long-run bidirectional causality between gross domestic product and total government spending. The same results were reached by C. F. Tang (2009) on the example of Malaysia, Wu, Tang, and Lin (2010) on the 182 countries of the world, Taban (2010) on the example of Turkey, or Abu-Eideh (2015) in an investigation of the Palestinian territories.

The opposite effect, that is, the economic growth effect on the public sector size, was demonstrated by authors such as by Lamartina and Zaghini (2011) on the 23 OECD countries, Akinlo (2013) on Nigeria, or Biyase and Zwane (2015) on the 30 African countries.

The neutral relationship between the variables was confirmed by the studies such as by Rauf, Qayum, and Zaman (2012) on the example of Pakistan, or Ray and Ray (2012) on India.

For the needs of the present study, Table 1 was created, which offers an overview of the most common variables used in monitoring the impact of the public sector size on economic growth in EU countries. The public sector size is most often defined through total public revenues, total public expenditures, final consumption, and tax revenues as a percentage of gross domestic product. The other variables are often applied as the so-called control variables and the authors observe them precisely in relation to a demonstration of the public sector impact size on economic growth.

Table 1. Explained variables and their expected influence on economic growth in the EU countries

Variables	Authors	Impact
Total public revenue (% of GDP)	Afonso and Furceri (2010)	-
Total public expenditures (% of GDP)	Zimčík (2016), Lupu and Asandului (2017), Kim et al. (2018), Gurdal et al. (2021), Selvanathan et al. 2021)	-
Final government consumption (% of GDP)	Asimakopoulos and Karavias (2016), Zimčík (2016), Hajamini and Ali Falahi (2018)	-

Variables	Authors	Impact
Tax revenue (% of GDP)	Bergh and Karlsson (2009), Zimčík (2016), Gurdal et al. (2021)	-
Gross fixed capital	Asimakopoulos and Karavias (2016), Hajamini and Ali Falahi (2018)	+
Inflation	Asimakopoulos and Karavias (2016), Zimčík (2016)	-
Workforce	Bergh and Karlsson (2009), Zimčík (2016)	+
Population	Asimakopoulos and Karavias (2016), Kim, Wu, Lin (2018), Hajamini and Ali Falahi (2018)	+
Total unemployment	Lupu and Asandului (2017)	-
Crisis	Zimčík (2016)	-

Source: Author's contribution

2. Research methodology

The aim of the study is to identify the impact of the public sector size on the economic growth of EU countries. A set of variables for the 27 EU countries for the period 1996 to 2021 is examined. The data sources are the Eurostat, OECD, and World Bank databases. The panel regression is applied in order to identify the impact of the public sector size on economic growth that was employed in the works by the authors such as by Bergh and Karlsson (2009), Afonso and Furceri (2010), Zimčík (2016), and the others. The explained variable is the real gross domestic product growth in the European Union member countries. The public sector size is approximated by employing the four fiscal variables that are expressed as a proportion of the gross domestic product. These are commonly applied variables such as public expenditure, public revenue, tax revenue, and government final consumption that all result in the four independent models. The additional explanatory variables are included in the models that were selected according to the current state of knowledge. Their expected influence on the explained variable was also identified in Table 1. Several control variables were also added to the models to prevent distortion of the outcomes as stated by Bergh and Ohm (2001). Table 2 shows the abbreviation, source, and exact variable definition in the form, which it enters the models in.

Table 2. Explained variables

Abbreviation	Variable	Source
TR	Total public revenue (% of GDP)	Eurostat
TE	Total public expenditures (% of GDP)	Eurostat
FC	Final government consumption (% of GDP)	World Bank
TAX	Tax revenue (% of GDP)	Eurostat
GFC	Year-on-year gross fixed capital growth	OECD
CPI	Year-on-year inflation growth	Eurostat
LF	Year-on-year workforce growth	World Bank
P	Year-on-year population growth	World Bank
UN	Total unemployment (% of GDP)	World Bank
C	Crisis	Eurostat

Source: Author's contribution

The study by Zimčík (2016) also the dummy variable crisis to the explanatory variables too. Due to the cyclical fluctuations in the years 2008 and 2020, this is a variable that is expected to possess a negative impact on economic growth. For the purposes of the study, the crisis periods in the EU countries are identified on the cyclical component of the real gross domestic product that was obtained by extracting the trend by applying the Hodrick-Prescott filter (1981). The results for all the EU countries are presented in Table 3.

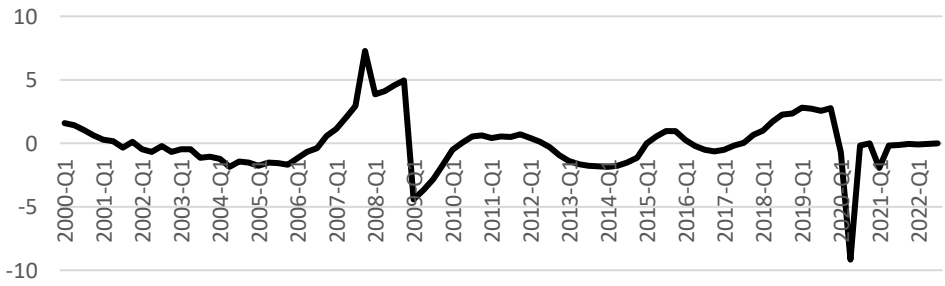
Table 3. Timely crisis identification

AT -2009,2020	**FR**-2009,2020	**MT**-2009,2020
BE -2009,2020	**DE**-2009,2020	**NL** -2009,2020
BG-2009,2010,2020	**EL**-2009-2012,2020	**PL** -2020
HR-2009,2020	**HU**-2009,2020	**PT** -2009,2020
CY-2009,2012,2020	**IE** -2009,2020	**RO**-2010,2020
CZ -2009,2020	**IT** -2009,2020	**SK**-2009,2020
DK -2009,2020	**LV**-2009,2010,2020	**SI**-2009,2020
EE-2009,2010,2020	**LT**-2009,2010,2020	**ES**-2009,2020
FI-2009,2020	**LU**-2009,2020	**SE**-2009,2020

Source: Author's contribution

For a majority of the EU countries, the consequences of the crises were reflected in the decline of gross domestic product in the period of 2009, 2010 and 2020. The first time this was a consequence of the crisis that broke out in 2008 and affected almost all the EU countries in a form of a significant decrease in gross domestic product. The exception was represented by Poland which managed to maintain moderate economic growth during this period. However, the Covid-19 pandemic arrival had a negative impact on economic growth in all the EU countries led to the identification of the 2020 crisis. For an illustration, the presented Figure shows the cyclical component of the gross domestic product for Slovakia, which it is possible to identify the crisis in the years 2009 and 2020 according to.

Figure 1. Gross domestic product cyclic development of Slovakia



Source: Author's contribution

The descriptive statistics of the other variables are presented in Table 4.

Table 4. Descriptive statistics of the analysed variables

Variable	Average value	Median	Minimum	Maximum	Standard deviation
HDP	2.57	2.83	-14.84	25.18	3.84
TR	42.47	42.20	22.30	57.90	6.55
TE	45.10	45.10	24.30	64.90	6.78
FC	19.82	19.55	11.67	27.93	2.97
TAX	36.43	36.10	20.60	49.70	6.09
GFC	3.91	3.45	-67.68	150.47	12.64
CPI	4,92	2.14	-4.48	1 058.37	40.73
LF	0.52	0.49	-9.55	7.72	1.70
P	0.21	0.22	-3.85	3.93	0.82
UN	8.69	7.63	1.81	27.47	4.31

Source: Author's contribution

As the panel data contains time series, the problem of the data nonstationarity may occur. It was checked through the Maddala-Wu, Im-Paseran-Shin and Levin-Lin-Chu unit root tests. The problem of the data nonstationarity was identified for the variables such as gross fixed capital, inflation, labor force and population. Subsequently, the variables were replaced by the first differences that led to the solution of the problem during the repeated testing. The variables then appear in the models in a form shown in Table 2. There is a strong correlation between the variables that represent the public sector size as each government tries to balance its public revenues and expenditures. For this reason, the models were constructed so that only one variable representing the public sector size was involved in them. Multicollinearity was tested with the help of the variance inflation factor, which all the variables did not even exceed a level of two for. Hence, it is possible to confirm that the variables are not burdened by the problem of multicollinearity.

The econometric relationship has the following form:

$$GDP\ growth = \alpha_i + \beta_1 GFC + \beta_2 CPI + \beta_3\ LF + \beta_4\ P + \beta_5 UN + \beta_6 C + \beta_7 GS + u_{it} \quad (1)$$

where GS represents the government size that takes one of the four forms: TE (model I), TR (model II), FC (model III), or TAX (model IV).

The panel regression models were constructed for the pooled model, for the fixed effects model, and the random effects model. Subsequently, the F-test was employed to decide between the pooled regression model and the fixed effects model. The Breusch-Pagan LM test helps to decide whether to apply the pooled regression model or the random effects model is more appropriate. The last fundamental test is the Hausman test that decides between the fixed effects model and the random effects

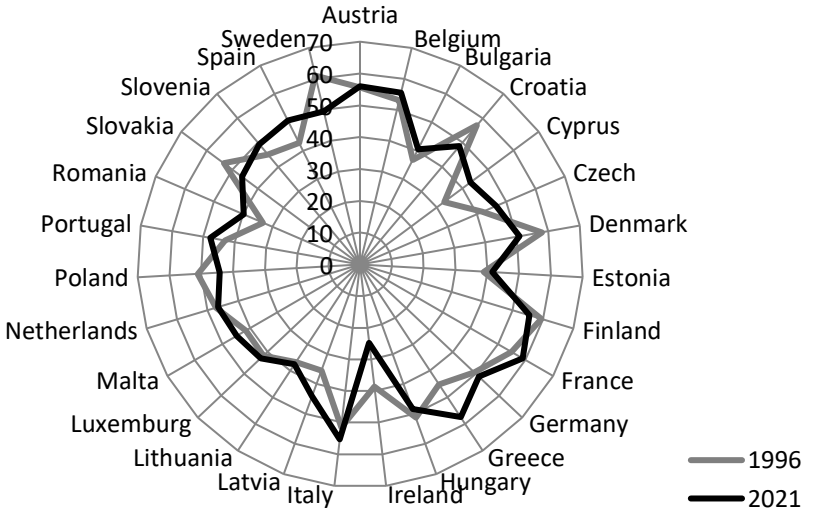
model. The model assumptions were also tested. For the panel data, autocorrelation was detected through the Breusch–Godfrey test, heteroskedasticity through the Breusch-Pagan test, and cross-sectional dependence through the Pesaran CD test that decides about the residuals are correlated among the entities.

3. Research results and discussions

3.1. Analysis of the public sector size in the EU countries

The public sector size is most often measured by the share of public expenditure in gross domestic product. There are differences in the public sector size in the EU countries that mainly lie in an approach related to the social and redistribution policy. Figure 1 illustrates the public sector size in the EU countries in the period 1996 to 2021.

Figure 2. Public sector size (public expenditures as a percentage of gross domestic product) in the EU countries in the period 1996 to 2021



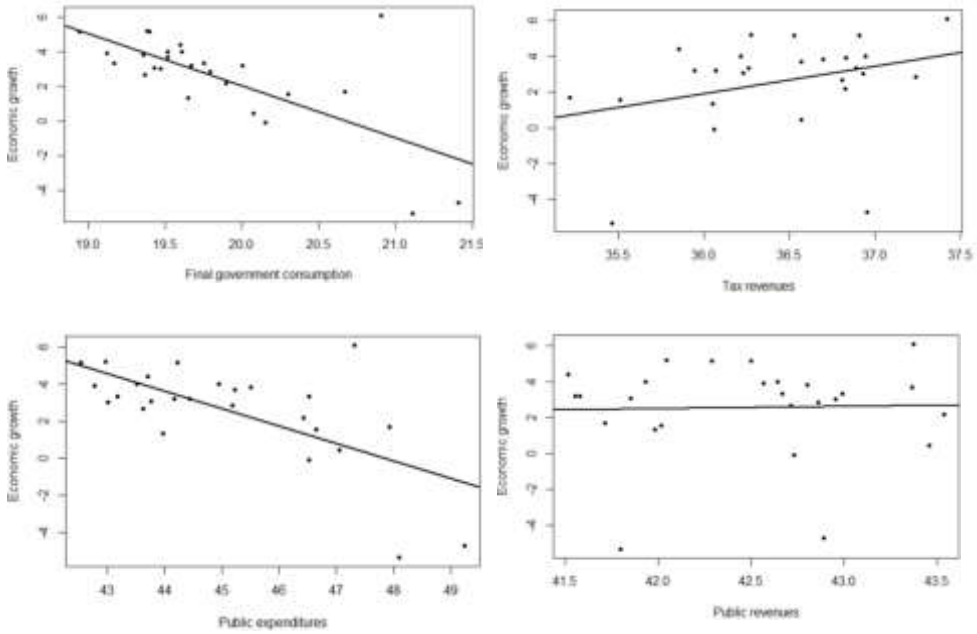
Source: Author's contribution

Figure 1 points to the differences in the public expenditures volume in the EU countries as well as to the different changes in development during the explored period. Austria, Belgium, Denmark, Finland, France, Germany, Greece. and Spain belong among the countries whose public expenditures accounts for more than 50 % of gross domestic product currently. Only Ireland, Lithuania, and Romania have a share of less than 40 %. In the period of 1996 to 2021, the public sector has diminished in the countries such as Croatia (-8.6%), Denmark (-7.2%), Finland (-4%), Hungary (-2.7%), the Netherlands (-0.6%), Poland (-6.9%), Slovakia (-7%),

Sweden (-11.5%) and Ireland (-13.8%). Therefore, it is obvious that there are the significant differences between the EU countries in management of the public sector size and the need for country intervention in the economy. According to Forte and Magazzino (2010), the optimum level of a public expenditures to gross domestic product share is at a level of 37 %, while Table 4 demonstrates that the average value in the EU is at a level of 45.1 %. Nevertheless, the authors draw an attention to the different optimum values depending on the explored subgroups of the EU member countries. According to Boór (2015), the optimum government size was determined at the intervals from 45.49 % to 52.06 % for the EU member countries. Also, Buljan et al. (2017) state there is a space in the EU countries to reduce the public sector size while achieving the same output mainly through an increase of the government efficiency itself.

Figure 3 illustrates the correlation diagrams of the four variables representing the public sector and economic growth in the EU member countries.

Figure 3. Correlation diagrams of the public sector and economic growth in the EU member countries in the period 1996 to 2021



Source: Author's contribution

Figure 3 shows that the relationship between final government consumption, public spending, and economic growth is inversely proportional. It is not possible to determine for sure from the diagrams that the public sector size impact on economic growth will be negative. It can be seen that the relationship between the public sector

and economic growth alters in the different depiction of the public sector through a comparison. While in the case of tax revenues the regression line is relatively skewed and thus, it indicates a positive effect, in the case of public revenues, it is almost flat.

3.2. Models of the public sector size influence on economic growth

The four separate panel regression models containing one variable representing the public sector and the group of the other explanatory variables were constructed in order to determine the effect of the public sector size on economic growth. For each case, the appropriateness of an application of the pooled regression model, and the fixed and random effects models were tested. All the models were significant and based on the Hausman test, the fixed effects model was selected as the most appropriate one. For this test, the p-value was less than a five-per-cent significance level. In the case of the present study, the fixed effects method was more accurate than the random effects method. The next step consisted of testing the assumptions of the selected model, whose results are presented in Table 5.

Table 5. The results of the fixed effects model assumptions

	I	II	III	IV
F-test	2.059e-06	2.706e-06	2.624e-10	1.603e-05
BP LM test	1.4e-05	7.747e-05	7.612e-16	0,0001
Hausman test	0.0011	2.086e-05	0.02137	0.0005
Breusch–Godfrey /Wooldridge test	8.658e-08	3.001e-08	3.001e-08	6.41e-09
Breusch-Pagan test	7.964e-10	1.381e-07	1.381e-07	3.976e-10
Pesaran CD test	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Source: Author's contribution

The outcome of the tests was represented by the identification of the unwanted phenomena – namely, autocorrelation, heteroskedasticity, and cross-sectional correlation. Therefore, robust estimates were constructed that led to the more accurate results. A summary of the results is presented in Table 6. The fixed effects of the EU countries are presented in the Appendix.

Table 6. The Panel regression outcome

	I	II	III	IV
GFC	**0.1151** 0.0001 ***	**0.1025** 0.0013 **	**0.1089** 0.0004 ***	**0.1139** 0.0001 ***
CPI	**-0.0322** 0.0000 ***	**-0.0309** 0.0000 ***	**-0.0323** 0.0000 ***	**-0.0311** 0.0000 ***
LF	**0.2756** 0.0018 **	**0.2086** 0.0009 ***	**0.2247** 0.0009 ***	**0.2788** 0.0016 **
P	**1.1233** 0.0004 ***	**1.1703** 0.0000 ***	**0.9978** 0.0003 ***	**1.0972** 0.0003 ***
UN	**-0.1202**	**-0.0777**	**-0.1187**	**-0.1347**

	I	II	III	IV
	0.0005 ***	0.0167 *	0.0006 ***	0.0000 ***
C	**-6.3882** 0.0000 ***	**-5.7582** 0.0000 ***	**-6.0198** 0.0000 ***	**-6.4534** 0.0000 ***
TR	**-0.2238** 0.0002 ***			
TE		**-0.2158** 0.0000 ***		
FC			**-0.3547** 0.0049 **	
TAX				**-0.1948** 0.0011 **
R^2	0.6009	0.6124	0.6002	0.5939
n	702	702	702	702

Source: Author's contribution

The overall coefficient of determination was relatively high for all models and was at the level of 0.6, which indicates their high explanatory power. The assembled panel regression models showed a statistically significant negative impact of the growth of the public sector size on the economic growth of the EU countries in all four models at the significance level of 0.05. This influence is most pronounced in the case of final government consumption. This result is consistent with studies such as Asimakopoulos and Karavias (2016), Zimčík (2016), d'Agostino, Dunne and Pieroni (2016), Hajamini and Ali Falahi (2018). The identified negative impact can be explained by the nature of government consumption, which consists only of current expenses of a non-investment nature, which are intended to directly satisfy the individual and collective needs of the population. This is also confirmed by the results of the model when using public expenditures, the growth of which by one percent will cause a smaller decrease in the gross domestic product than the final government consumption, assuming ceteris paribus. According to Hajamini and Ali Falahi (2018), the current expenditure of the countries should be around 16.60%, while the average value was determined to be 19.55% from the descriptive statistics of the set. Thus, the use of capital expenditures of an investment nature has the potential to mitigate the negative effects of ordinary government consumption.

In the case of total and tax revenues, a greater impact was demonstrated for total revenues, which is in line with Gurdal et al. (2021).

The coefficients of the control explanatory variables are consistent with the results of similar studies presented in Table 2. In the case of gross fixed capital and labor force growth, a positive effect on gross domestic product growth was demonstrated in all models. According to Okun's law, there should be a negative relationship between unemployment and gross domestic product growth. This was also confirmed in the case of the presented study. The presence of the crisis also had a predicted negative impact of the dummy variable on gross domestic product growth. The models showed that the crisis presence had the most significant negative impact on gross domestic product growth among all the monitored variables.

4. Conclusions

The public sector size and its impact on the economic growth of the countries are the subject of many disputes. Currently, there are several currents that differ widely and argue that this impact depends significantly on the group of countries and the methods applied. The overview of the current state of knowledge in the presented study led to the assumption that in the case of the EU countries, we should expect a negative impact of the public sector size on economic growth. To confirm this assumption, the four different views were selected in order to quantify the public sector size through total public expenditure, total public revenue, tax revenue, and final government consumption. Applying the panel regression model, the negative impact of the public sector size on economic growth was demonstrated on the data for the period 1996 to 2021 in all four models which is in a consensus with the Keynesian view. The EU countries should prevent the further increase of the public sector and according to the results, it appears to be insufficiently efficient and thus, leads to resource waste and the achievement of a lower level of economic growth. The countries such as Croatia, Denmark, Finland, Hungary, Slovakia, and Sweden shift the direction of a reduction of public spending, even though their share still represents around half of the gross domestic product. Only Ireland and Lithuania have a significantly lower share of the public sector in gross domestic product. According to the results of Lupu and Asandului (2017), the optimum level for European countries is between 37 % and 41 % of the gross domestic product. According to Boór (2015), the value is between 45.49 % and 52.06 %. Nevertheless, it may not be the optimum limit for every country, as the public sector size is strongly bound to the redistribution level in the country, the set tax system, and the provision of public goods.

The results of the regression panel models confirmed the strong negative impact of the crisis presence on economic growth. It also has an impact on the country‘s ability to reduce its public sector. During the 2008 crisis, the Covid 19 pandemic and the beginning of the war in Ukraine, the public expenditure of the states increased significantly. These were primarily non-investment expenditures aimed at the help of the businesses and residents in the form of transfers. As it has been proven, this type of spending has a negative impact on the achievement of economic growth in the country. In the same way, the current high rate of inflation has increased the price of the current expenses, even if, on the other hand, it has contributed to the tax revenues growth, although that also negatively affects economic growth. In the case of crises, it is mainly a fact of appropriate management of public expenditures with the aim of minimizing negative impacts on the economy.

The EU countries should be aware of the negative impacts of an expanding public sector and optimize the public sector size to a level that will help that country to use public resources efficiently. The goal should be to focus on investment-type expenditures and thus, to promote a reduction in the current expenditures share that has demonstrably more significant negative impacts on gross domestic product

growth. Nevertheless, this has to be among the country‘s strategic goals regardless of the political cycle.

The presented study was aimed at identification of the public sector size impact on gross domestic product growth in the EU countries as a whole. The possibilities for further research involve a determination of the optimum level of the public sector size at the national and supranational levels as well as an identification of this impact through the other perspectives on the public sector measurement. One possibility is to express the share volume of state employees in all employed or to focus only on the influence of selected state expenditures such as education or infrastructure, which can help to accelerate economic growth in EU countries.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgment

This work was supported by Tomas Bata University in Zlín with project no. RO/FaME/2022/05.

References

Abu-Eideh, O. M. (2015). Causality between public expenditure and GDP growth in Palestine: An econometric analysis of Wagner’s Law. *Journal of Economics and Sustainable Development*, 6, 189-199.

Afonso, A., Furceri, D. (2010). Government size, composition, volatility and economic growth. European Journal of Political Economy, 26(4). [cit. 2022-04-23]. Available at:< https://www.sciencedirect.com/science/article/abs/pii/ S017626801000008X >

Agénor, P. R. (2010). A theory of infrastructure-led development. J. Econ. Dynam. Control 34 (5), 932-950.

Akinlo, A. E. (2013). Government spending and national income nexus for Nigeria. *Global Journal of Business Research*, 7(1), 33-41.

Asimakopoulos, S., Karavias, Y. (2016). The impact of government size on economic growth: A threshold analysis. *Economics Letters*, 139, 65-68. https://doi.org/10.1016/j.econlet.2015.12.010

Bergh, A., Kerlsson, M. (2009). Government Size and Growth: Accounting for Economic Freedom and Globalization. Public Choice, 142(1/2), 195-213. https://doi.org/10.1007/s11127-009-9484-1

Bergh, A., Öhrn, N. (2011). Growth Eff ects of Fiscal Policies: A Critical Appraisal of Colombier´s (2009) *Study. IFN Working Paper* No. 865. https://doi.org/10.2139/ssrn.2111152

Biyase, M., Zwane, T. (2015). Economic growth and government expenditures in Africa: panel data analysis. *Environmental Economics*, 6(3), 15-19.

Boór, M. (2015). Optimal Government size in European Union in interaction with economic growth. *Finance and Risk*, 1, 170.

Bose, N., Haque, M.E., and Osborn, D.R. (2007). Public expenditure and economic growth: A disaggregated analysis for developing countries. Manchester Sch, 75(5), 533-556

Bouakez, H., Guillard, M., and Roulleau-Pasdeloup, J. (2016). The optimal composition of public spending in a deep recession. University of Lausanne, Faculty of Business, Department of Economics.

Bove, V., Efthyvoulou, G., and Navas, A. (2017). Political cycles in public expenditure: Butter vs guns. *Journal of Comparative Economics*, 45(3), 582-604. https://doi.org/10.1016/j.jce.2016.03.004.

Buljan, A., Šimovič, H., and Deskar_Škrbič, M. (2017). Public expenditure efficiency and the optimal size of government in European union. In: *European Entrepreneurship Forum 2017 Eurozone: Evolution or Revolution?* p. 29.

Cooper, T. J. (2020). An analysis of the impact of the size and type of government intervention on economic growth in South Africa. Doctoral Dissertation, North-West University (South Africa)

D'Agostino, G., Dunne, J. P., and Pieroni, L. (2016). Government Spending, Corruption and Economic Growth. In World Development, 84, 190-205. https://doi.org/10.1016/ j.worlddev.2016.03.011

Divino, J. A., Maciel, D. T., and Sosa, W. (2020). Government size, composition of public spending and economic growth in Brazil. *Economic Modelling*, 91, 155-166. Available at: https://doi.org/10.1016/j.econmod.2020.06.001.

Ebaidalla, E. M. (2013). Causality between government expenditure and national income: Evidence from Sudan. *Journal of Economic Cooperation and Development*, 34(4), 61-76

Facchini, F., Seghezza, E. (2018). Public spending structure, minimal state and economic growth in France (1870-2010). *Economic Modelling*, 72, 151-164. https://doi.org/10.1016/j.econmod.2018.01.014.

Forte, F., Magazzino, C. (2010). Optimal size of government and economic growth in EU-27. Available at: https://mpra. ub. unimuenchen. de/26669/1/forte_ magazzinooptimal_size_of_government_and_economic_growth_in_eu-27. pdf.

Ghose, A., Das, S. (2013). Government size and economic growth in emerging market economies: A panel cointegration approach. *Macroecon. Finance Emerg. Mark. Econ*. 6, 14-38.

Gurdal, T., Aydin, M., and Inal, V. (2021). The relationship between tax revenue, government expenditure, and economic growth in G7 countries: new evidence from time and frequency domain approaches. *Economic Change and Restructuring*, *54*, 305-337. https://doi.org/10.1007/s10644-020-09280-x

Hajamini, M., Falahi, M. A. (2018). Economic growth and government size in developed European countries: A panel threshold approach. *Economic Analysis and Policy*, 58, 1-13. https://doi.org/10.1016/j.eap.2017.12.002

Hodrick, R. J., Prescott, E. (1981). Post-War U.S. Business Cycles: An Empirical Investigation. Northwestern University, Center for Mathematical Studies in Economics and Management Science Discussion Paper 451.

Chobanov, D., Mladenova, A. (2009). What is The Optimum Size of Government. Institute for Market Economics, Bulgaria.

Kim, D.-H., Wu, Y.-C., and Lin, S.-C. (2018). Heterogeneity in the effects of government size and governance on economic growth. In *Economic Modelling*, 68, 205-216. https://doi.org/10.1016/j.econmod.2017.07.014

Kosempel, S. (2004). Finite lifetimes and government spending in an endogenous growth model. J. Econ. Bus., 56, 197-210.

Lamartina, S., Zaghini, A. (2011). Increasing public expenditure: Wagner's Law in OECD countries. *German Economic Review*, 12, 149-164.

Loizides, J., Vamvoukas, G. (2005). Government expenditure and economic growth: Evidence from trivariate causality testing. *Journal of Applied Economics*, 8, 125-152. https://doi.org/10.1080/15140326.2005.12040621

Lupu, D., Asandului, M. (2017). The nexus between economic growth and public spending in Eastern European countries. *Engineering Economics*, 28, 155-161. https://doi.org/10.5755/j01.ee.28.2.7734

Nyasha, S., Odhiambo, N. M. (2019). Government size and economic growth: A review of international literature. *Sage Open*, 9(3), 2158244019877200. https://doi.org/10.1177/2158244019877200

Rauf, A., Qayum, A., and Zaman, A. (2012). Relationship between public expenditure and national income: An empirical investigation of Wagner's Law in case of Pakistan. *Academic Research International*, 2, 533-538.

Ray, S., Ray, I. A. (2012). On the relationship between government's developmental expenditure and economic growth in India: A cointegration analysis. *Advances in Applied Economics and Finance*, 1(2), 86-94.

Romero-Ávila, S., Strauch, R. (2008). Public fi nances and long-term growth in Europe: Evidence from a panel data analysis. *European Journal of Political Economy*, 24(1), 172–191. DOI: 10.1016/j.ejpoleco.2007.06.008.

Samudram, M., Nair, M., and Vaithilingam, S. (2009). Keynes and Wagner on government expenditures and economic development: The case of a developing economy. Empirical Economics, 36, 697-712. https://doi.org/10.1007/s00181-009-0264-z

Selvanathan, E., A., Selvanathan, S., and Jayasinghe, M. S. (2021). Revisiting Wagner's and Keynesian's propositions and the relationship between sectoral government expenditure and economic growth. *Economic Analysis and Policy*, 71, 355-370. https://doi.org/10.1016/j.eap.2021.05.005

Taban, S. (2010). An examination of the government spending and economic growth nexus for Turkey using the bound test approach. *International Research Journal of Finance and Economics*, 48, 184-193.

Thabane, K., Lebina, S. (2016). Economic growth and government spending nexus: Empirical evidence from Lesotho. *African Journal of Economic Review*, IV(1), 86-100.

Wagner, A. (1958). Three extracts on public finance. In R. A. Musgrave & A. T. Peacock (Eds.), Classics in the theory of public finance (pp. 119-136). London, England: Macmillan. (Original work published 1883)

Wu, S. Y., Tang, J. H., and Lin, E. S. (2010). The impact of government expenditure on economic growth: How sensitive to the level of development? *Journal of Policy Modeling*, 32, 804-817. https://doi.org/10.1016/j.jpolmod.2010.05.011

Zimčík, P. (2016). The Scope of Government and Economic Growth. *Politická ekonomie*, 64(4), 439-450. https://doi.org/10.18267/j.polek.1080

Appendix

Fixed effects of the EU countries

	I	II	III	IV
AT	13.9101	13.8928	9.8366	11.3647
BE	14.5053	14.3449	11.3117	12.3200
BG	12.2082	11.5324	10.1728	9.8010
HR	13.3087	13.2044	10.6996	10.6013
CY	13.1994	13.3902	10.9482	11.1517
CZ	12.3941	12.4363	10.5126	10.1878
DK	15.0378	14.2406	11.7157	12.2169
EE	13.4288	12.7596	11.7030	11.3349
FI	15.5078	14.6525	11.5540	12.1633
FR	14,7565	14,8160	11,5095	12,3064
DE	12.5308	12.1955	9.3514	10.3698
EL	13.4626	13.8083	10.8118	10.9879
HU	13.0756	13.4815	10.6501	10.6188
IE	14.6018	14.8830	12.8852	13.0681
IT	12.4233	12.3788	8.9106	10.3874
LV	12.1923	11.8154	11.1136	10.0860
LT	12.3521	12.1453	11.5476	10.5531
LU	14.7883	14.1532	10.7385	12.5338
MT	14.0657	14.5844	12.2960	11,8152
NL	12.6790	12.5296	11.3706	10.2532
PL	13.8539	13.9586	11.3442	11.7111
PT	11.9234	12.2355	9.3348	9.5391
RO	11.2084	11.3652	9.3662	9.4088
SK	13.8382	14.0233	12.2480	11.7353
SI	13.8629	13.9520	10.6123	11.4330
ES	13.1137	13.0856	11.0004	11.3655
SE	15.6015	14.9129	12.8858	12.7911

Source: Author's contribution