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Major Crises of the XXIst Century and Impact on Economic Growth

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Abstract: Global economic growth is noted to have been severely affected by the Great Recession in 2009, reaching its lowest level since the series began in 2019. This low was exceeded in 2020, in the sense that the level of economic growth in Q1 and Q2 2020 is well below 2009 due to countries' efforts to stop the COVID-19 pandemic. Cases of coronavirus that have occurred since February–March 2020 have started to produce significant effects on economic growth, and the evolution of the economic growth indicator is in decline for the countries analysed. The article is aiming to develop two models (using Empirical Regression Model) that analyse the influence of macroeconomic indicators on economic growth. Our study covers EU member countries in Central and Eastern Europe from 2001–2020 Q2. Using the same variables and coefficients for both models, six for the first model and seven for the second model with the addition of coronavirus cases, we see a change in the behaviour of independent variables. The authors consider that this variable influences the economic situation in a country because it has caused the change in the unfavourable direction of certain macroeconomic indicators with a direct influence on economic growth. By adding cases of coronavirus (Cc) the equation becomes broader and contains several variables that explain the evolution of economic growth. Each of the indicators changes its value, but it is noted that variables with negative coefficients decrease further (e.g., Cs, GvS). Our findings in this article confirm that of all the determinants analysed, CsGw, Ret, GvS, and Cc overwhelmingly influence economic growth.

Keywords: economic growth; regression analysis; macroeconomic indicators; coronavirus cases

1. Introduction

The 2019–2020 pandemic has led to countries engaging in a war on three key fronts: firstly, in the health system plan, which has been allocated massive funds to fight the spread of the virus and to treat the sick. At present, all countries focus on epidemiological measures to slow the spread of the virus. Secondly, economically, countries face serious problems with great social impact. Budget deficits have increased because large sums have been injected to avoid an economic collapse. Some countries have even increased their public debt. In most Western countries the economy relies primarily on domestic consumption. Isolation of people in March, April, and May through "social distance" has had an unfavorable impact on the economies of those countries [1]. Thirdly, in terms of how to work in the future ("telework" or work from home).

Countries are working on protecting their citizens in quarantine or isolation at home by increasing the capacity to maintain essential supply chains, such as those in the areas of food supply, energy, and medicines. The economy contracted in the first half of 2020 due to the COVID-19 pandemic. Businesses have closed and consumers have isolated, slowing consumption. Retail sales recorded negative values in Q1 and Q2 2020. The same happened in 2008–2009. The negative economic impact generated by the pandemic, already existing, is impressive. Probably like in 2008, there will be an economic recession. Less clear is its scale. There have been massive falls on the stock exchanges, some even dramatic. Companies were temporarily closed, employees were introduced to the "technical unemployment" system, and production was zero in some sectors. Under these conditions, the investments are very low or almost none. The crisis can be caused not only by a decrease in demand, but also by one in supply due to the decrease in production, the consequences being a generalised shortage of products and a rapid increase in prices. Thus, the supply-side shock was induced by aggregate demand massive reduction, in conjunction with the decline of people income (and future insecurity of income), uncertainty about the further recovery and the horizon of normalisation. Export volumes have fallen as export markets have collapsed, with countries setting other priorities during this period. But that is just one of the dimensions of the challenge. It will be a severe economic downturn caused by panic and the abandonment of more substantial investments by companies, at least in the short and medium-term, due to uncertainty.

Due to blocking, isolation and quarantine, people faced problems related to food, transport, health, and social activities [2]. As a result, countries in the European Union are facing an unprecedented economic shock resulting from the COVID-19 pandemic. The number of coronavirus cases is continuously increasing. Healthcare and containment measures and the resulting impact on production, demand and trade have reduced economic activity and led to higher levels of unemployment, a steep fall in corporate incomes, increased government spending, an economic downturn and widening disparities within and between the Member States. The extraordinary macroeconomic and fiscal impact is still ongoing. This creates exceptional uncertainty in closing the production gap while ensuring the sustainability of public debt and ultimately correcting the excessive deficit. The main objective of countries' policies is to have high and sustainable economic growth. However, to achieve and maintain a high growth rate, policymakers need to understand the drivers of growth, as well as how policies affect economic growth. When analysing the relationship between macroeconomic indicators and economic growth, most researchers analysed the influence of the following indicators: foreign direct investment, inflation, unemployment rates, government spending, labour productivity, government bonds and interest rates on public debt. Over the past two decades, hundreds of empirical studies have tried to identify growth determinants. This is not to say that growth theories are of no use for that purpose. Rather, the problem is that different growth theories are typically compatible with one another.

Given the complexity and range of the problem, from several factors influencing economic growth, in this research we selected indicators whose developments have changed significantly since the emergence of the Covid-19 pandemic: Government debt; Consumption; Consumption growth; Investment; Government spending; Retail sales. The reason for choosing these indicators was that their evolution changed significantly with the coronavirus epidemic which led to population-restrictive measures by state governments. The paper addresses the issue of dependency and the impact of the 6 indicators on economic growth. We have not found studies in the empirical literature that provide a comparative analysis of the impact of the 6 indicators (mentioned above) on economic growth comparing the two major crisis periods of the 21st century: 2008 and 2020.

The negative development of economic growth during the two periods (2008–2009 and 2020) may be due to different developments. We examine them in our study, looking for answers to the following questions: To what extent are the two periods similar and different? What were the major factors influencing the evolution of economic growth in the two periods analysed? Comparing the two periods is useful and instructive, not only to better understand the economic and social contexts behind tax phenomena but also because past experiences can provide answers to our questions about current events.

The purpose of this article is to develop two models that analyse the influence of macroeconomic indicators on economic growth. The aim is to identify those indicators that most significantly influence economic growth in the Central and Eastern Europe countries (which are EU members) as well as to analyse the intensity of correlations. The first model covers the period 2001–2019 and the second model covers the period 2001–2020 Q2. In Model 2 we added another indicator: coronavirus cases. At last, we try to answer the two questions above. The selected countries are those in Central and South-Eastern Europe: Latvia, Slovakia, Greece, Hungary and Poland, Croatia and Slovenia, Estonia, Bulgaria, Lithuania, Czech Republic, and Romania.

This study strives to cover the above research gap by providing a robust empirical investigation based on well-established theoretical considerations. We identify the macroeconomic factors determining economic growth by using Ordinary Least Square (OLS) method for cross-section data. Firstly, we analysed whether independent variables are not multi collinear by using the correlation matrix. Then, the T-test was used to test the significance of the coefficients. The overall significance of the model was tested by using the F test. R-squared shows the extent to which the variation of the dependent variable is explained by the independent variables in the model.

The study offers a unique approach to comparing the two periods of crisis: the 2008 economic crisis and the pandemic crisis in 2020.

Our study covers EU member countries from Central and Eastern Europe in the period 2001–2020 Q2. In the second section, we presented the revision of scientific literature. In Section 3, we described the data and research methodology, namely the variables used, and specified the empirical results of our model and compared them with different studies. The work concludes with findings and deductions about the results.

2. Literature Review

Assessing global economic growth in real-time is a key point for macroeconomists responsible for monitoring global economic problems, but also a real challenge for economists. Another thing to remember is that the global economic growth was heavily affected by the Great Recession in 2009, reaching its lowest level since the start of the series until 2019, which can also be seen in our model. Its lowest value was exceeded in 2020, suggesting that it may be the case that the level of economic growth in Q1 and Q2 2020 is well below 2009 due to countries' efforts to stop the COVID-19 pandemic. In most of the countries our study is based upon, there is a much lower level of economic growth compared to 2008, 2009 (see Figure 1).

The first line of research focuses on investigating the direct/indirect correlation between public debt and economic growth. Many studies investigate the relationship between public debt and economic growth. Most support a negative effect of public debt on economic growth. Among the works that have addressed the influence of government debt on economic growth are Gómez-Puig et al. [3] which indicates that high public debt tends to hinder economic growth by increasing uncertainty about future taxation, eliminating private investment and weakening a country's resilience to shocks. In other works of literature, many empirical studies find a non-linear negative relationship between public debt and economic growth. For example, Kumar and Woo [4] confirm that only high levels of debt (rates above 90% of GDP) have a significant negative impact on economic growth. They note that a 10-percentage point increase in the initial debt ratio is associated with a slowdown in the real GDP growth rate per capita of 0.2 percentage points per year. Cecchetti, Mohanty and Zampolli [5] also note in various growth regression specifications that the threshold beyond which public debt harming economic growth is around 85% of GDP. Checherita-Westphal and Rother [6] note a non-linear impact of debt on long-term growth, with a turning point of about 90–100% of debt to GDP. Some studies point out that the negative relationship between public debt and growth depends on country-specific factors and the institutions ([7,8]). Moreover, Donayre and Taivan [9] examine the causal direction between public debt and real economic growth in a sample of 20 OECD countries for the years 1970–2010 and note that rich countries tend to face low real economic growth as a result of rising public debt.

Other studies show the non-linearity of the public debt effect on economic growth. Reinhart and Rogoff [10] suggest that high debt levels are negatively correlated with economic growth, although there is no link between debt and growth when public debt is below 90% of GDP. Pattillo et al. [11] used data from 100 developing countries and concluded that there was a non-linear relationship between the net present value of foreign debt and economic growth. Cordella et al. [12] however, notes a negative relationship between foreign public debt and economic growth only in developing countries with intermediate levels of debt and in developing countries with very low or very high levels of debt this relationship disappears.

Figure 1. *Cont.*

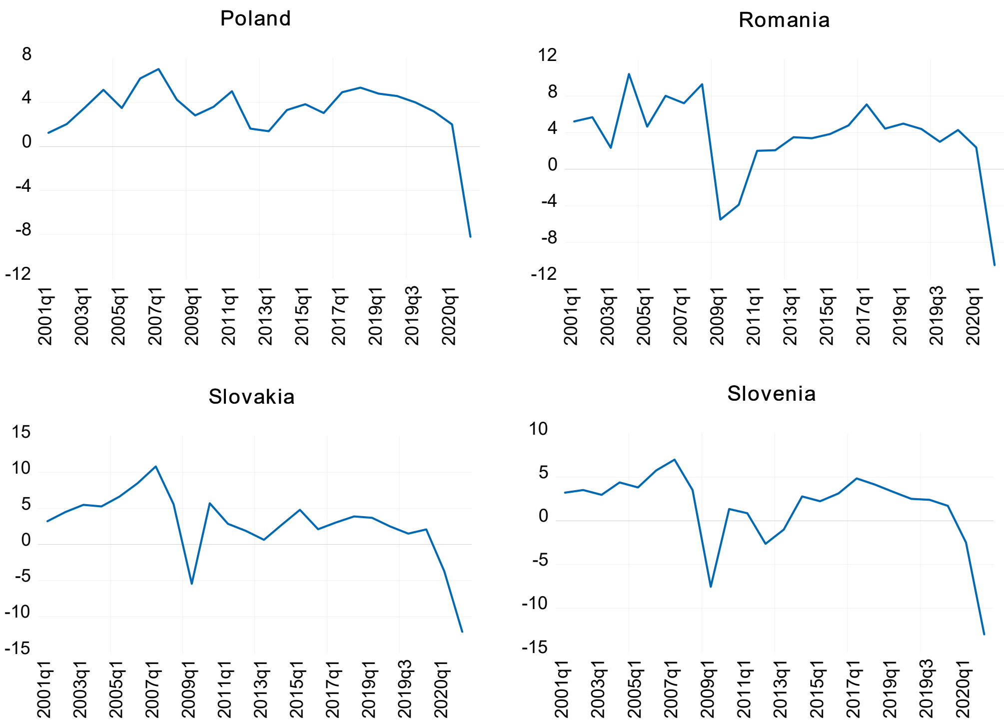

Figure 1. The Economic Growth of Central and Eastern European Countries (2001–2020Q2).

Even though many of previous studies lead to a negative association of public debt with economic growth, there is a contrasting view. Some studies show different results, namely: a positive effect of public debt on economic growth: some authors argue that public loans can improve the economy when it is intended for public investment. Modigliani et al. [13], Creel and Fitoussi [14], Le Cacheux [15] and Blanchard and Giavazzi [16] support the idea of the "Golden Rule of Public Finance (GRPF)." The main idea behind the Golden Rule is that public loans are harmful only when used for current spending, but not when they accumulate public capital, namely, the purpose and composition of public loan issues. Baum, Checherita-Westphal and Rother [17] argue that the short-term impact of government debt on economic growth is positive and very statistically significant, but falls to about zero and loses its significance when the ratio of public debt to GDP reaches around 67%. The empirical results of Ahmad et al.'s study [2] support the assumption that the effect of public debt on economic growth is a function of corruption and concluded that in a very transparent–not corrupt–country, public debt increases economic growth and vice versa.

Some studies show the neutrality of the relationship; for example, Jakobs et al. [18] investigates the causal relationship between public debt rates and growth rates for 31 EU and OECD countries and have found no causal link between public debt and economic growth, regardless of levels of the public debt ratio.

The second line of research focuses on investigating the direct/indirect correlation between consumption and economic growth. Anghel et al. [19] argue that the increase in final consumption is directly correlated with economic growth, as measured by the GDP macroeconomic indicator. Alper [20] investigates the relationship between growth and consumption in Brazil, Russia, India, South Africa and Turkey. He used the panel data method using annual data for the period 2005–2016 and pointed out that a 1% increase in consumer spending leads to a 0.41% increase in economic growth.

The measures introduced by European governments this year (2020) to limit the spread of the COVID-19 epidemic (social distance, closure of most commercial premises) directly or indirectly affected the consumption of the population and therefore consumer price indices. In the case of 2020, the problem is twofold: on the one hand, the steep increase in unemployment, temporary suspension from work or inactivity of self-employed people have led households to reduce consumption. On the other hand, there is no reason for firms to invest in a context where demand for products is low and there is a lot of uncertainty. Many companies have a high risk of bankruptcy being completely "devoid" of forecasted cash flows. The contraction of aggregate demand is also so acute that it could very well explain why rising inflation possible because of supply constraints, do not pose a serious threat for now [21].

The third line of research focuses on investigating the direct/indirect correlation between investment and economic growth. Investment is one of the main components of aggregate demand. Investment plays an important role in economic growth. The effect of investment on economic growth is recently a strong topic for both developing and developed countries. Separately, public investment and economic growth are heated economic topics. Economic growth depends mainly on public investment [22].

Today, several studies have tested the relationship between investments (in all its forms: public, private, foreign direct investment, etc.) and economic growth, and some have found a link between the two variables. These conclusions or findings vary depending on the methods used in the research, variable options, etc. Uddin et al. [22] noted that public and private investment simultaneously play an important role in rapid economic growth. Both public and private investment are needed to increase real GDP, where public investment is large compared to private investment. Cucos [23] in his paper argues that there is a positive relationship between investment and economic growth. Cavallo and Daude [24] argue in their paper that public investment has a positive effect on economic growth. Zainah [25] plays the role of public investment in promoting economic growth in an African island country Mauritius from 1970 to 2006, using a vector error correction model (VECM) to analyse the effects. It concluded that public investment makes a significant contribution to economic performance, to economic growth. Haque and Kneller [26] in their paper concluded that corruption increases public investment but reduces its effects on economic growth. They suggested that policies to deter corruption and increase the efficiency of public investment could give very positive boosts to economic growth. Nguyen and Nguyen [27] used a quantitative method in their study to assess the impact of public investment on private investment and growth, based on data from 18 developing countries over 21 years (1995–2015). Their findings show that all public investment and investment in public-private partnership affect private investment as well as economic growth, but the effects vary cyclically, depending on the period and the group of countries. For developing countries in Asia, public investment has a positive impact on economic growth, with the inverted U-shaped model, which stimulates growth in the short and medium-term, but in the long term, the effects of increased stimulus tend to decline.

Concerning foreign direct investment, the findings are contradictory, but extensive research shows that FDI has a positive effect on economic growth. Kukeli et al. [28], on their research, notes a positive relationship between FDI and production in ten Central and Eastern European countries. Pradhan [29] investigates the relationship between ISD and economic growth in ASEAN countries, namely Indonesia, Malaysia, Thailand, Singapore, and the Philippines, between 1970 and 2007. The study finds a two-way co-integration between FDI and economic growth, except for Malaysia. Some studies show an insignificant positive impact of FDI on economic growth, sometimes even a negative impact [30]. Cakerri et al. [31] in their study claim that: a 1% increase in FDI lag (lnFDI) will lead to a 4.35% Gross Domestic Product lag increase.

The fourth line of research focuses on investigating the direct/indirect correlation between Government spending and economic growth. The size of government spending and its effect on long-term economic growth, and vice versa, has been an issue of interest sustained for decades. Macroeconomics, especially Keynesian school of thought, suggests that government spending accelerates economic growth. Thus, public expenditure is considered an exogenous force that alters aggregate production [32].

Gregoriou and Sugata [33] present a study that analyses the impact of government spending on growth for 15 developing countries. Using GMM techniques, the authors showed that countries with substantial public expenditure have strong growth effects. Cooray's study [34] investigates the role of government in economic growth by expanding the neoclassical production function to incorporate two dimensions of government—size and quality. Size is measured by government spending and governance quality, and the model is tested on a cross-section of 71 economies. Empirical results indicate that both the size and quality of government are important for economic growth.

Aschauer [35] argues that the increase in public spending accelerates economic growth. For example, public spending on social services increases labour productivity and increases the growth of national production. In the same vein, government spending on infrastructure lowers the cost of production, encourages private sector investment, and promotes economic growth.

For high-income economies, empirical results have consistently reported a positive relationship between productive public spending and economic growth [36–38]. In the case of low- and medium-income economies, the findings on the relationship between the level of public spending and economic growth are mixed. In this respect, Gupta et al. [39] used a group of 39 low-income countries and found that productive public spending increased growth, while non-productive spending failed to do so. Christie [40] revealed an inverse relationship between productive public spending and real GDP per capita for developing economies.

Several researchers have examined the correlation between public spending and economic growth in different regions, but there is no concrete result on which the components of public spending have a direct effect on economic growth [41]. For example, Barlas's study [42] looked at the impact of spending on economic growth in Afghanistan. The results show that dependent and independent variables are stationary at their level and the first difference. Estimated education and infrastructure coefficients directly affect the rate of economic growth. However, security expenditure is negatively linked to economic development.

Babatunde [43] argues that increasing government spending reduces economic growth. He believes the government can cover this improvement by raising taxes.

The fifth line of research focuses on investigating the direct/indirect correlation between retail sales and economic growth. Retail-based development is often overlooked, but it is a vital component of the local economy. Phillips [44] makes some arguments for supporting retail-based development:

- Retail is a "clean" development. Retail trade, in general, is less destructive to the natural environment compared to other land uses, such as manufacturing. It is rarely contested by citizens or environmental groups based on possible environmental degradation [45].
- Retail is a growing industry. While employment has fallen in manufacturing and other sectors due to technology, the retail sector continues to expand.
- Retail is a basic element of local economies. Retail taxes are a major source of revenue for many communities. Besides, property taxes for retail development also generate revenues [46].
- On average, retail "returns" to the community in the form of tax payments are larger than office, residential or industrial properties.

Pittman and Phillips [47] explain why retail sales have a positive influence on economic growth: retail sales increase the amount of revenue available in a community and helps reduce retail spending losses in the community.

Therefore, we note that, as more econometric problems are addressed, the effect of the six indicators (Government debt; Consumption; Consumption growth; Investment; Government spending; Retail sales) on economic growth is becoming more robust, corroborating the predictions of the proposed theoretical model. Our empirical analysis controls for heterogeneity according to time, country-specific, growth rates. We also address endogeneity issues and allow heterogeneity between countries in terms of model parameters and cross-sectional dependencies.

Therefore, our contribution to the empirical literature is twofold. First, unlike previous studies, we do not use panel estimation techniques to combine the power of cross-section mean with all the subtleties of temporal dependence; rather, we explore the size of the time series of the problem to obtain additional evidence based on the historical experience of each country in the sample, to detect potential heterogeneities in the relationship between the countries of Central and Eastern Europe. Secondly, our econometric methodology is data-based and allows us to select the statistical model that best approximates the relationship between the variables studied for a given country and to assess the influence of the 6 indicators (for Model 1) or 7 indicators (for Model 2) on economic growth.

3. Research Methodology and Data

To achieve the research objective, the authors used several methodological approaches. The basis of the research was the content-causal analysis of theoretical knowledge and practical research. Concerning theoretical approaches (presented in the previous section of this paper), we have defined the macroeconomic indicators that we have included in the database for analytical processing by econometric methods. Based on an analysis of a set of studies addressing several macroeconomic indicators, the authors decided to use the following indicators (as independent variables) for this empirical research: Government debt; Consumption; Consumption growth; Investment; Government spending; Retail sales. All these indicators are placed in the category of influence variables. The dependent variable is economic growth. The sample includes a cross-section of 12 EU member countries in Central and Eastern Europe. The reason for choosing countries is twofold. One, data for all independent variables are available for this group of countries. Two, the sample is chosen in such a way as to capture the countries of the eastern half of Europe. Moreover, from the 12 countries that make up the sample, 6 countries come from the Euro area and 6 countries have their national currency. The data used for the 2 models cover the period 2001–2020Q2 and are annual (period 2001–2018) and quarterly (period 2019–2020Q2). The data from this study were obtained from the following sources: World bank database; theglobaleconomy.com website; sites of national central banks and governments in the analyzed countries. Proxies and expected relationship of all the variables is provided in Table 1.

Table 1. Variables Description and Their Relationships.

Category		Proxy or Definition Measurement	Expected Sign
Independent variables			
Government debt	GvD	Government debt as a percent of GDP (Only core debt instruments are included, defined here as comprising (i) currency and deposits; (ii) loans; and (iii) debt securities.)	-
Consumption	Cs	Household Consumption as a percent of GDP	+
Consumption growth	CsGw	The percent change in Household Consumption from the same quarter last year.	+
Investment	Inv	Investment as a percent of GDP (Gross fixed capital formation including land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings as a percent of GDP)	+
Government spending	GvS	Government spending as a percent of GDP	-
Retail sales	Ret	Retail sales Y-on-Y (The retail sales Y-on-Y is an aggregated measure of the sales of retail goods over a stated period. Because retail sales are a measure of consumer demand for finished goods, they are a leading macroeconomic indicator of the pulse of an economy and its projected path toward expansion or contraction. Retail sales Y-on-Y is calculated as the percent change in the Retail sales index from the same month the previous year. The Retail sales Y-on-Y measures only volume changes, i.e., price level changes are excluded.)	+
Coronavirus cases (this variable is used only in the Model 2)	Cc	Number	-
Dependent variable			
Economic growth		EcGw	the rate of change of real GDP

Source: Authors' view.

We will build two models:

- Model 1: we will analyse the influence of six indicators (GvD, Cs, CsGw, Inv, GvS, Ret) on economic growth in the period 2001–2019, a period that also includes the influence of the economic crisis of 2008.
- Model 2: in addition to the six indicators we added another variable (coronavirus cases) for the period 2001–2020Q2 to see the measure of pandemic influence on economic growth. Specifically, the first cases of coronavirus (Cc) occurred in the first quarter of 2020.

3.1. Empirical Regression Model

In statistical modelling, regression analysis is used to estimate the relationships between two or more variables. Regression analysis helps us understand how the dependent variable evolves when one of the independent variables varies, thus allowing the mathematical determination of variables that have a greater impact on the dependent variable. We present linear regressions between economic growth (EcGw) and coronavirus cases (Cc), government debt (GvD), consumption (Cs), consumption growth (CsGw), investment (Inv), government spending (GvS), retail sales (Ret) for EU countries in Central and Eastern Europe.

The empirical function is posed as follows:

$$\text{EcGw} = F(\text{Cc, GvD, Cs, CsGw, GvS, Inv, Ret, Cc}) \tag{1}$$

3.2. Model 1

First step, we move to a brief graphical overview of the level of the dependent variable (Economic growth) of the countries of Central and Eastern Europe for the period 2000–2020Q2. According to Figure 1, we can see a similar trend for all countries analysed. A significant decrease is observed in the crisis years, 2008–2009. The same major downward trends are also recorded for the first two quarters of 2020 with an ongoing economic crisis. For 2008–2009 the lowest values are recorded by Latvia, Lithuania, and Estonia. Higher values for 2009 were maintained by Poland, Bulgaria, and the Czech Republic, and in the second quarter of 2020, Lithuania, Estonia, and Bulgaria are better than the other countries but are still negative (−4.2 for Lithuania, −6.9 for Estonia, and −8.7 for Bulgaria). Economic growth depends on the characteristics of the country, the conditions of the financial market, the behaviour of governments, private agents, the population, and the multiple functions of growth.

As measures of normality of data are considered skewness and kurtosis. The skewness indicator, or degree of asymmetry, is a measure to verify the probability distribution of a variable random to the actual value on its mean. The lower the value of this indicator, the closer the value of the distribution is to normality, so the value 0 indicating a normal skewness and that the distribution is symmetrical around its mean, positive skewness with higher values and negative skewness with lower values. In the case of indicators of consumption growth, government debt and investment are observed a skewness greater than 0, so our data have more extreme values on the right, with the distribution tilted to the left, and consumption, economic growth, government spending, and retails are lower than 0, with extreme values on the left and the distribution tilted to the right (see Table 2). The kurtosis indicator measures whether a normal distribution is present or missing, as well as how flat, or what curve tip this distribution has. Most non-consumption indicators have values greater than 3, belonging to a positive kurtosis with a peak, leptokurtic curve. Consumption with a value of 2.34 has a platikurtic distribution with a flatter curve. Also, the government spending indicator with a value of 3.05 and investments with a value of 3.16 being closer to the value of 3 suggests a normal distribution with a mesokurtic kurtosis. The Jarque-Bera indicator is a test to verify the normality of distribution by measuring the difference between skewness and kurtosis of variables with those in a normal distribution. The probability or p-value after this indicator helps us to create an opinion and decide whether we accept or reject the hypothesis that we have a normal distribution.

Table 2. Descriptive Statistics.

Statistics	Cs	CsGw	EcGw	GvD	GvS	Inv	Ret
Mean	59.35413	6.345568	3.114432	48.52091	18.78686	24.98905	4.025871
Median	60.05000	5.590000	3.510000	39.75500	18.84828	24.66000	4.085000
Maximum	76.01000	50.87000	11.89000	198.5100	23.31000	40.48000	24.46000
Minimum	45.81000	−17.91000	−14.81000	3.800000	13.74000	10.06000	−28.05000
Std. Dev.	6.561088	6.967252	3.789179	38.28335	1.789512	5.369318	7.063894
Skewness	−0.228534	1.436498	−1.564309	2.011208	−0.332486	0.024020	−0.463486
Kurtosis	2.342673	11.93971	8.161289	7.638157	3.055069	3.168700	6.041091
Jarque-Bera	7.050890	969.8984	400.6987	414.6157	4.897424	0.338442	111.1827
Probability	0.029439	0.000000	0.000000	0.000000	0.086405	0.844322	0.000000
Observations	264	264	264	264	264	264	264

Source: authors' processing.

Hypothesis (H_0). *There is a normal distribution*

Hypothesis (H_1). *There is an abnormal distribution*

If the value is greater than 0.05, we accept the null hypothesis and we have a normal distribution, however, if it is less than 0.05 then we reject the null hypothesis, and accept the alternative hypothesis that we have an abnormal distribution. In the case of the indicators we have, only government spending and investments that have a *p* coefficient value of more than 0.05, so we accept the null hypothesis and can say that we have a normal distribution. In the case of the other indicators, the *p*-value is less than 5%, so we reject the null hypothesis and accept the alternative hypothesis, assuming an abnormal distribution for the other indicators. Although most indicators have an abnormal distribution, this does not mean that we will not be able to achieve a dependency correlation between indicators. Because we have a series of chronological data, a normal distribution is not so important for our regression.

From Table 3 we can find a statistically significant linear relationship between Cs and EcGw at a significance level of 1% (*p*-value = 0.0003). The entire statistically significant linear relationship is between CsGw and EcGw and between Ret and EcGw (*p*-value = 0.0000). The sign of the CsGw and Ret coefficients is the one expected, being positive. Also, considering all the six variables, we found that CsGw and Ret can be a determining factor for economic growth.

Table 3. Estimation of Parameters for the Linear Regression Model. Dependent Variable: EcGw (Included observations: 264).

Variable	Coefficient	t-St.	*p*-Value
C	7.312589	3.048197	0.0025
GvD	0.011444	2.255246	0.0250
Cs	−0.089723	−3.652446	0.0003
CsGw	0.228433	8.230620	0.0000
Inv	0.082274	2.344913	0.0198
GvS	−0.208514	−2.401288	0.0170
Ret	0.244376	10.03939	0.0000
R-squared 0.681400			
Adjusted R-squared 0.673962			
Prob(F-statistic) 0.000000			

Source: authors' processing.

As a result of this model, we see that all our variables are significant with a probability value of less than 5%. Standard errors have low values which indicate that the variables are indeed significant, but to ensure that we will also check the correlations between variables.

The correlation is used to measure the strength of the relationship between two variables. It can be positive, negative, or zero. The correlation coefficient can take any value between +1 and −1. A correlation matrix is a table that shows correlation coefficients between sets of variables. Each random variable (Xi) in the table is related to each of the other values in the table (Xj). Table 4 shows the paired correlations of economic growth (EcGw), consumption (Cs), consumption growth (CsGw), government debt (GvD), government spending (GvS), investment (Inv), and retail sales (Ret) for the 12 countries analysed. We found a very poor correlation between Cs and EcGw (coef. = −0.055) and a much stronger correlation between CsGw and EcGw (coef. = 0.707) (see Table 4). The strongest correlation is between Ret and EcGw (coef. = 0.738). So, the strongest correlation with EcGw is given by retail. This result is confirmed by other studies: Anghel et al., 2017 [19], Alper (2018) [20].

Table 4. Estimating Correlations Between Variables.

Variable	EcGw	Cs	CsGw	GvD	GvS	Inv	Ret
EcGw	1.000000	−0.055315	0.707565	−0.298653	−0.297301	0.381505	0.738383
Cs	−0.055315	1.000000	0.179911	0.349781	−0.091229	−0.372543	0.040570
CsGw	0.707565	0.179911	1.000000	−0.342182	−0.303653	0.369238	0.619229
GvD	−0.298653	0.349781	−0.342182	1.000000	0.364266	−0.614882	−0.238489
GvS	−0.297301	−0.091229	−0.303653	0.364266	1.000000	−0.048986	−0.267493
Inv	0.381505	−0.372543	0.369238	−0.614882	−0.048986	1.000000	0.259505
Ret	0.738383	0.040570	0.619229	−0.238489	−0.267493	0.259505	1.000000

Source: authors' processing.

Although the Panel Least Squares Method is one of the best known and used, it does not recognize the heterogeneous nature of cross-sections. To have the most accurate analysis, we will also use linear models of constant and random effects (Table 5). The first estimates a common single effect and the second estimates using an average effect distribution.

Table 5. Estimation of parameters for the linear regression model.

Variable	Constant Effects			Random Effects		
	Coefficient	t-St.	*p*-Val	Coefficient	t-St.	*p*-Val
C	13.12069	4.121258	0.0001	9.084784	3.610428	0.0004
Cs	−0.179017	−4.026723	0.0001	−0.111485	−3.907688	0.0001
CsGw	0.271017	9.755233	0.0000	0.245741	9.170300	0.0000
GvD	0.016757	1.696574	0.0210	0.015971	2.673912	0.0080
GvS	−0.327059	−3.001909	0.0030	−0.283533	−3.108292	0.0021
Inv	0.133387	3.423250	0.0007	0.107772	3.069969	0.0024
Ret	0.222933	9.467092	0.0000	0.234990	10.11654	0.0000
	R-squared 0.728648 Adjusted R-squared 0.709896			R-squared 0.690720 Adjusted R-squared 0.683499		

Source: authors' processing.

To decide which of these two models, the one with fixed effects or random effects is more suitable, we will perform the Hausman test (Table 6). Thus, we formulate the following hypotheses:

Hypothesis (H_0). *The random-effects model is suitable*

Hypothesis (H_1). *The fixed-effects model is suitable*

Table 6. Hausman Test.

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		17.465112	6	0.0077
Cross-section random effects tests comparisons:				
Variable	**Fixed**	**Random**	**Var (Diff.)**	**Prob.**
Cs	−0.179017	−0.111485	0.001162	0.0476
CsGw	0.271017	0.245741	0.000054	0.0006
GvD	0.016757	0.015971	0.000062	0.9205
GvS	−0.327058	−0.283533	0.003549	0.4650
Inv	0.133387	0.107772	0.000286	0.1298
Ret	0.222933	0.234990	0.000015	0.0018

Source: authors' processing.

Following this test (Table 6) we compared the linear regression model between fixed and random effects, obtaining a value of less than 5% for p-value, meaning that we reject the null hypothesis and accept the alternative hypothesis, a linear regression model with fixed effects. Therefore, we focus the analysis on the linear regression model with fixed effects. By removing the results obtained from the estimation of parameters for the linear regression model with fixed effects in Table 5 we conclude that the p-value is significant because all variables of the model with fixed effects have values below 5%. As the R-squared shows us, these variables influence 72%. Thus, indicators of consumption, consumption growth, government debt, government spending, investment, and retail sales explain 72% of the change in economic growth and present a successful estimate for the regression equation. Adjusted r-squared has a value of 70.9%. The other 29.1% is assumed to be the influence of other factors on the dependent variable outside of the model that we did not catch in this model.

The general linear regression equation is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_\mathrm{n} X_\mathrm{n} \quad (2)$$

where Y is the dependent variable (EcGw), β_0, β_1, β_2, β_n are the coefficients and X_0, X_1, X_2, X_n are the independent variables (Cs, CsGw, GvD, GvS, Inv, Ret).

According to Data in Table 5 (fixed effects), it appears that the variables CsGw (0.27) and Ret (0.22) have the greatest positive impact on EcGw and the GvS variable (−0.32) has the greatest negative impact on EcGw. The signs of the CsGw and Ret coefficients are the ones expected, being positive. If CsGw increases by one point, EcGw will increase by about 0.27 points. If Ret increases by one point, EcGw will increase by about 0.22 points. The sign of the GvS coefficient is negative, meaning that if GvS increases by one point then EcGw will decrease by 0.32 points.

3.3. Model 2

Skewness has values higher than 0 for consumption growth, government debt, investment, and coronavirus cases with left-leaning distribution and values lower than 0 for growth, consumption, government spending, and retail sales with the right-leaning distribution. Kurtosis has values greater than 3 for economic growth, consumption growth, government debt, retail sales, coronavirus cases with a positive kurtosis. Government spending and investments are very close to 3 indicating a normal distribution, whereas the consumption indicator is the only one with a kurtosis below 3 (Table 7).

From Table 8 we can find a statistically significant linear relationship between Cs and EcGw at a significance level of 1% (p = 0.0002). A significant linear relationship is also observed between GvS and EcGw with a meaning level of 1% (p = 0.0006). As with the previous model (Model 1) and Model 2, there is a statistically significant linear relationship between CsGw and EcGw and between Ret and EcGw (p-value = 0.0000). Also, in this model we have introduced another variable (coronavirus cases—Cc) and with which we find a statistically significant linear relationship (p-value = 0.0000).

The sign of the CsGw and Ret coefficients is the one expected, being positive and the Cc coefficient is negative. Also, considering the seven variables, we found that Cc, CsGw, and Ret may be determining factors for economic growth.

Table 7. Descriptive Statistics.

Statistics	EcGw	CsGw	Cs	GvD	GvS	Inv	Ret	Cc
Mean	2.411111	5.530729	59.31059	49.47264	18.94242	24.56924	3.480868	612.5000
Median	3.235000	5.365000	60.10000	39.98000	19.00642	24.29000	3.745000	0.000000
Maximum	11.89000	50.87000	76.01000	198.5100	24.34444	40.48000	24.46000	48300.00
Minimum	−15.27000	−20.86000	45.81000	3.800000	13.74000	10.06000	−28.05000	0.000000
Std. Dev.	4.643965	7.592429	6.604935	38.90685	1.839598	5.485310	7.246021	4194.764
Skewness	−1.609860	0.728856	−0.217518	2.038936	−0.264420	0.024777	−0.457502	8.716387
Kurtosis	6.492311	9.777842	2.336081	7.698493	3.158873	3.104734	5.547766	83.83153
Jarque-Bera	270.7541	576.7689	7.560535	464.4585	3.658942	0.161099	87.94015	82051.66
Probability	0.000000	0.000000	0.022817	0.000000	0.160498	0.922609	0.000000	0.000000
Observations	288	288	288	288	288	288	288	288

Source: authors' processing.

Table 8. Estimation of Parameters for the Linear Regression Model. Dependent Variable: EcGw (Included observations: 288).

Variable	Coefficient	t-St.	*p*-Value
C	11.11302	4.079421	0.0001
Cc	−0.000191	−5.056055	0.0000
Cs	−0.106218	−3.799007	0.0002
CsGw	0.320400	11.01639	0.0000
GvD	0.010633	1.898332	0.0587
GvS	−0.340459	−3.462571	0.0006
Inv	0.049920	1.298304	0.1953
Ret	0.183662	6.970800	0.0000
R-squared 0.705014			
Adjusted R-squared 0.697639			
Prob(F-statistic) 0.000000			

Source: authors' processing.

As a result of this model, we see that all our variables are significant with a probability value of less than 5%, With the exception of GvD and Inv. Standard errors have low values which indicate that the variables are indeed significant, but to make sure we will also check the correlations between variables.

We found a stronger correlation in this model between CsGw and EcGw (coef. = 0.755) (see Table 9) comparing it with Model 1, the strongest correlation being between them. After checking the correlations, we can certainly argue that we do not have multicollinearity present in our model although the correlation between consumption growth and economic growth is 0.75, their probability in the model of the least panel squares shows us a value below 0.05. Next, we used the fixed and random effects method, after which we will perform the Hausman Test.

Table 9. Estimating correlations between independent variables.

Variable	ECGW	CsGw	Cs	GvD	GvS	Inv	Ret	Cc
ECGW	1.000000	0.755964	−0.011564	−0.294952	−0.412440	0.380144	0.663098	−0.380191
CsGw	0.755964	1.000000	0.191320	−0.332164	−0.392176	0.381822	0.597071	−0.256179
Cs	−0.011564	0.191320	1.000000	0.367352	−0.101149	−0.365031	0.035931	−0.024086
GvD	−0.294952	−0.332164	0.367352	1.000000	0.372720	−0.599189	−0.235424	0.008596
GvS	−0.412440	−0.392176	−0.101149	0.372720	1.000000	−0.096229	−0.307602	0.155612
Inv	0.380144	0.381822	−0.365031	−0.599189	−0.096229	1.000000	0.307151	−0.106859
Ret	0.663098	0.597071	0.035931	−0.235424	−0.307602	0.307151	1.000000	−0.177496
Cc	−0.380191	−0.256179	−0.024086	0.0085960	0.1556120	−0.106859	−0.177496	1.000000

Source: authors' processing.

As we carried out the first model, to decide which of these two models, the one with fixed effects or with random effects is more suitable, we will perform the Hausman test. Thus, we formulate the following hypotheses:

Hypothesis (H_0). *The random-effects model is suitable*

Hypothesis (H_1). *The fixed-effects model is suitable*

Following this test, we compared the linear regression model with fixed or random effects, obtaining less than 5% for *p*-value, meaning that we reject the null hypothesis and accept the alternative hypothesis, a linear regression model with fixed effects (Table 10). Therefore, we focus the analysis on the linear regression model with fixed effects.

Table 10. Hausman Test.

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		29.466633	7	0.0001
Cross-section random effects tests comparisons:				
Variable	**Fixed**	**Random**	**Var (Diff.)**	**Prob.**
Cc	−0.000169	−0.000182	0.000000	0.1443
Cs	−0.235004	−0.123680	0.001547	0.0047
CsGw	0.366323	0.332730	0.000076	0.0001
GvD	0.005853	0.013181	0.000085	0.4279
GvS	−0.438485	−0.391870	0.004254	0.4748
Inv	0.085279	0.066489	0.000351	0.3158
Ret	0.165171	0.177527	0.000014	0.0011

Source: authors' processing.

By removing the results obtained from the estimation of parameters for the linear regression model with fixed effects in Table 11 we conclude that the *p*-value is significant because all variables of the model with fixed effects have values below 5%, with exception of GvD. As R- squared shows us, these variables' influence is 74%. Thus, the indicators of coronavirus cases, consumption, consumption growth, government debt, government spending, investment, and retail sales explain 74% of the change in economic growth and present a successful estimate for the regression equation. Adjusted R-squared has a value of 73%. Unlike model 1, other factors from this model that we did not take into account have an influence of only 27%. This econometric model is presented with the probability of the Fisher test with a value of 0. This way we can build the regression equation. For this, we will use the general equation of linear regression in which we will replace our variables.

The general linear regression equation is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n, \quad (3)$$

where Y is the dependent variable (EcGw), β_0, β_1, β_2, β_n are the coefficients and X_0, X_1, X_2, X_n are the independent variables (Cs, CsGw, GvD, GvS, Inv, Ret, Cc).

According to data presented in Table 10 (fixed effects), it appears that the variables CsGw (0.366323) and Ret (0.165171) have the greatest positive impact on EcGw and the variable GvS (−0.438485) has the greatest negative impact on EcGw. The signs of the CsGw and Ret coefficients are the ones expected, being positive. If CsGw increases by one point, EcGw will increase by about 0.36 points. If Ret increases by one point, EcGw will increase by about 0.16 points. The sign of the GvS coefficient is negative, meaning that if gvS increases by one point then EcGw will decrease by 0.43 points. Regarding the variable Cc, the sign is the expected one, negative. If Cc increases by one point (points mean the number of illnesses), EcGw will decrease by 0.000169 points.

Table 11. Estimation of Parameters for the Linear Regression Model.

Variable	Fixed Effects			Random Effects		
	Coefficient	**t-St.**	***p*-Val**	**Coefficient**	**t-St.**	***p*-Val**
C	19.77306	5.553999	0.0000	12.53696	4.575971	0.0000
Cc	−0.000169	−4.590867	0.0000	−0.000182	−5.072206	0.0000
Cs	−0.235004	−4.751683	0.0000	−0.123680	−4.125988	0.0000
CsGw	0.366323	12.62486	0.0000	0.332730	12.02453	0.0000
GvD	0.005853	0.529636	0.5968	0.013181	2.176684	0.0303
GvS	−0.438485	−3.717818	0.0002	−0.391870	−3.987868	0.0001
Inv	0.085279	2.038428	0.0425	0.066489	1.777371	0.0766
Ret	0.165171	6.571557	0.0000	0.177527	7.144270	0.0000
	R-squared 0.749943 Adjusted R-squared 0.733211 Prob (F-statistic) 0.000000			R-squared 0.712493 Adjusted R-squared 0.705306 Prob (F-statistic) 0.000000		

Source: authors' processing.

4. Discussion

The graphs generated in Figure 2 show a comparison between the estimated economic growth values in the two econometric models. The estimated value in the first model is represented by the green colour and the estimated value in the second one by the blue colour. We observe a lower trend values for estimated economic growth in the second model. Of course, these results presented in Figure 2 could be assessed in the light of the specific economic conditions prevailing in each of the sample countries. Coronavirus cases bring a significant influence on it and paint a more realistic picture of the present economic growth. As the second model showed us, the probability of the influence of independent variables represented by R square increased by 2% from 72% in the first model to 74% in the second. We can certainly argue that the second model allows us to analyse a situation where economic growth is a cumulative influence of the various variables, the number of which can expand more the upcoming years, with new crises and new influence factors

Both models present an attempt at analysis and show a cumulative dependence on economic growth. Using the same variables and coefficients for both models, a total of six for model 1 and seven for the second with the addition of coronavirus cases, we see a change in the behaviour of independent variables. We can see that for both models the independent variables with the highest coefficients are the consumption growth, retail sales and investment, and the variables with the lowest values for government spending and consumption. Each of the indicators changes its value, however, it is observed that variables with negative coefficients decrease, while those with positive coefficients are divided into two groups, some increase, and others decrease, so the consumption coefficient decreases from −0.17 to −0.23, government spending from −0.32 to −0.43, and consumption growth increase from 0.27 to 0.36, retail sales decrease from 0.22 to 0.16, as well as investments, decrease from 0.13 to 0.08, and government debt decreases from 0.016 to 0.005. The coefficient of the equation decreases by 3 from 13.12 to 19.77. In both models following the Hausman Test, a probability of less than 5% is observed, indicating a more accurate model by using the fixed effects method.

With the occurrence of coronavirus cases, there was a decrease in Cs, Inv and Ret, caused by the cessation of some companies' activities during the application of the emergency state o by governments. The evolution of some indicators has become acute (e.g., GvS) (see Table 12).

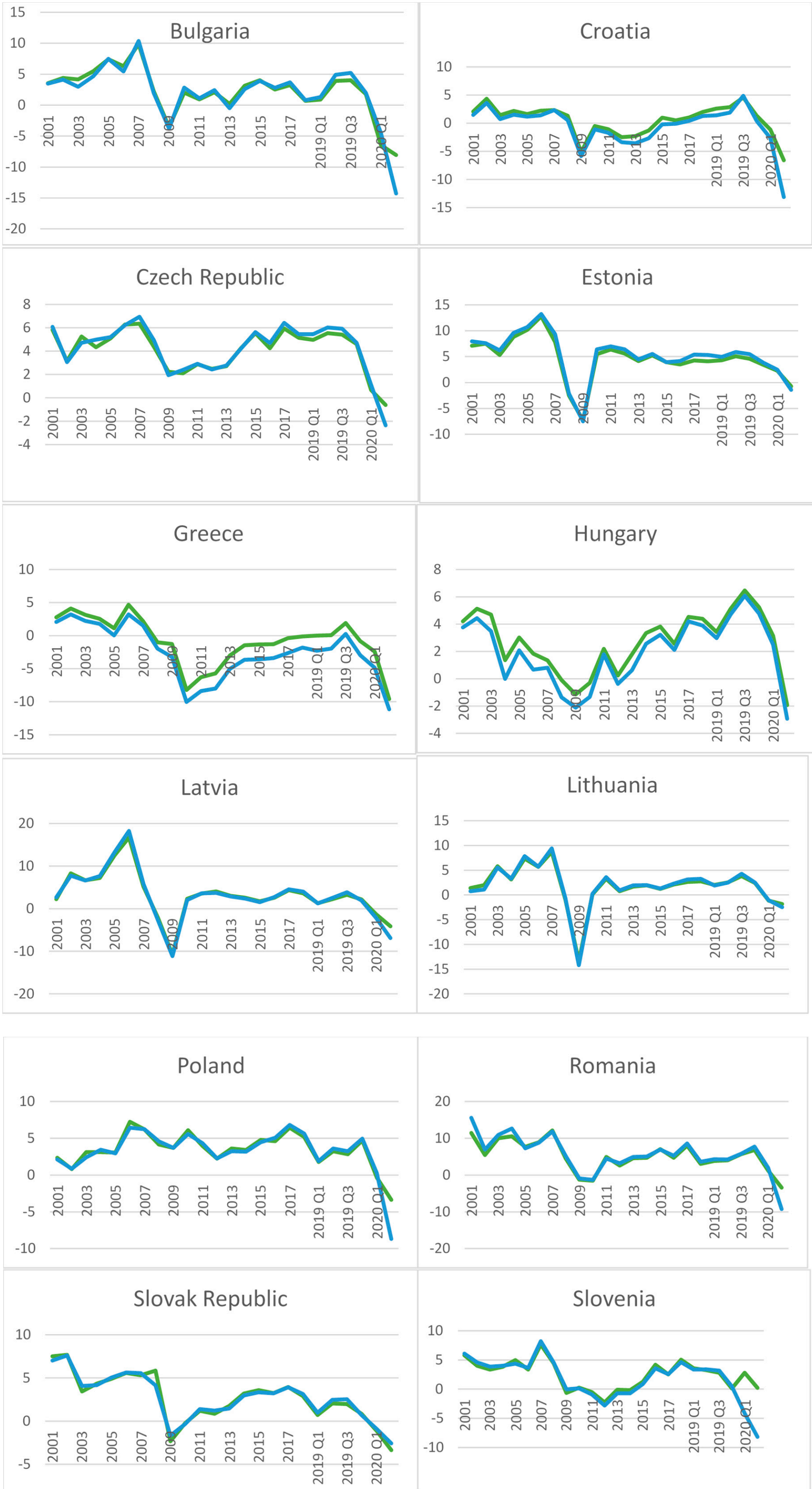

Figure 2. Comparison of the estimated data in Model 1 of the evolution of economic growth in the analysed countries with those estimated in Model 2.

Table 12. Comparative Analysis of Models.

	Cs	CsGw	GvD	GvS	Inv	Ret	Cc
Model 1	−0.179017	0.271017	0.016757	−0.327059	0.133387	0.222933	-
Model 2	−0.235004	0.366323	0.005853	−0.438485	0.085279	0.165171	−0.000169

Source: authors' processing.

By adding cases of coronavirus, the equation becomes wider and contains several variables that could explain economic growth because the independent variables of model 2 explain and have a cumulative influence of 74% on economic growth, while without it only 72% (shown in model 1). Prob (F-statistic) is suitable for both models, with values suitable for adjusted R-square, greater than 60%. We can certainly argue that the estimated values of the economic growth of the second model are closer to the real ones, so we conclude the importance of the variable: cases of coronavirus (CC).

Cases of coronavirus that have occurred since February–March of this year have started to produce significant effects on economic growth, and the evolution of this indication is in decline for the countries analysed. This independent variable calculated only for the first two quarters of 2020 brings a major impact on economic growth and not through direct influence, but rather indirect, by modifying other indicators related to the Cc. It makes us wonder what is the multitude of external factors that we have not considered in our models that could have an impact and influence economic growth in the future. Also, what will continue to be the direction of economic growth with the multiplication of coronavirus cases, with all the fiscal and economic measures taken by the governments of the countries in our analysis?

5. Conclusions

The rapid expansion of the COVID-19 pandemic in early 2020, with the relocation of the epicentre of the crisis to Europe in March, has generated unprecedented measures in the affected states that tried to slow the spread of the disease and minimize human costs. The study was based on 12 countries with diverse economic and fiscal policies, six of them are in the euro area (Estonia, Greece, Latvia, Lithuania, Slovakia, Slovenia) and the other six countries are not part of the euro area (Bulgaria, Croatia, Czech Rep., Hungary, Poland, Romania). Some of these countries recorded high economic growth and a strong economic regime in 2019, and other countries had huge debts, a low level of economic growth, but all demonstrated a cumulative dependence on economic growth that can also be inferred from our analysis. It should be noted that in the first quarter of 2020, 5 of the 6 countries in the euro area recorded negative economic growth (except Lithuania). Also, in Q1 2020, of the non-euro area countries, 5 of the 6 countries under our analysis recorded positive economic growth (except Czech Rep.). All 12 countries under analysis recorded negative economic growth in Q2 2020 (Figure 1).

This paper implies that economic growth is influenced by many indicators, which have already been analysed in various scientific studies. Of all the macroeconomic indicators, the authors focused on Government debt; Consumption; Consumption growth; Investment; Government spending and Retail sales. In addition to the indicators used as a standard for explaining and anticipating economic growth, we also focused on the number of coronavirus cases recorded in the first two quarters of 2020. The authors consider that this variable influences the economic situation in each country because it indirectly led to an unfavourable change in certain macroeconomic indicators with a direct influence on economic growth. By adding cases of coronavirus (Cc) the equation becomes wider and contains several variables that could explain the evolution of economic growth because the independent variables of model 2 explain and have a cumulative influence of 74% on economic growth, while without it only 72% (shown in model 1).

The work contains a comparison between the two models, the synthesis being found in Section 4. Discussion. In response to the two questions in the Introduction, we can see that for both models, independent variables with the highest coefficients are consumption growth, retail, and investment, and the variables with the lowest values are government spending and consumption. Each of the indicators changes its value, but it is noted that variables with negative coefficients decrease further (e.g., Cs, GvS). It is worth noting in Model 2 the evolution of the 2 variables CsGw and Inv, the evolution being directly influenced by the occurrence of coronavirus cases because the states adopted the state of emergency by which the population had to stay at home. Our findings in this article confirm that of all the determinants analysed, CsGw, Ret, GvS, and Cc overwhelmingly influence economic growth.

The results of the study may have some significant implications for countries' decision-makers, as unsustainable economic growth (generated by a very strong fiscal stimulus or a combination of tax cuts and increases in budgetary expenditure) can lead to catastrophic and lasting effects on macroeconomic stability.

In this research, the authors focused primarily on the influence of macroeconomic indicators had on economic growth. This has been confirmed by many studies presented in Section 2. The devastating effects of the 2008 crisis, the remarkable repercussions of climate change, the continued decline in non-renewable resources and the increasingly worrying and gloomy predictions of life on planet Earth are the main reasons to support the urgent need to change current business models around the world. In this context, our modern society urges companies to include sustainability in their business model not only to achieve immediate positive economic results or a substantial competitive advantage but also for efficient and socially responsible economic growth and development, as well as the most necessary social and environmental performance [48]. Therefore, a future research direction will consist of analysing the correlation between the major crises of the 21st century and the impact on economic growth and sustainable human development, corporate social responsibility, corporate governance, business performance and the model of excellence, as these are valuable goals for any business and any economy these days.

The results of the research included in this paper can serve as a source of information and help to choose appropriate policy actions for sustainable economic growth and to focus in particular on those economic indicators that have a significant influence on EcGw. The dynamics of the interaction between the sovereign and banking sectors have direct implications for global financial stability, but these interactions are not well understood. The 2008 crisis emphasized the interdependence between the bank and sovereign default risk and showed that major shocks may lead to a self-reinforcing negative spiral [49]. There are authors (e.g., Lovreta & Lopez-Pascual) who provide evidence that structural dependence in the system extends to the interaction between the volatility of the bank's default risk and the volatility of the sovereign default risk. We, therefore, consider it necessary to include other factors in future research, such as: the interaction between the bank and sovereign default risk.

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