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Article

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Research Article

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The Effectiveness of Fiscal-Budgetary Measures to Counteract the COVID-19 Crisis. Evidence from EU Countries

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Abstract: The aim of this study is to analyse the fiscal-budgetary measures, which have been taken by almost all governments around the world, including EU countries, in an attempt to limit the negative impact of the pandemic blockade. In most cases, these measures concerned the granting of technical unemployment, the postponement of tax payments, and the suspension or postponement of loan instalments or their maturity. The present study focuses especially on tax and expenditure measures that EU countries have introduced in response to the COVID-19 crisis. With this purpose, a paired sample *t*-test and multiple linear regression are used based on balanced panel data for the 27 EU countries for the period 2000Q1–2020Q3. The obtained results show that COVID-19 crisis had a significant negative impact on GDP growth. At the same time, a significant increase in public debt and government deficit occurred due to COVID-19 crisis. However, resuming the findings, the intensity, and implicitly, the effect of these measures depends on the specifics of each economy.

Keywords: COVID-19 crisis, expenditure measures, tax measures

JEL: C33, E62, H25, O11, O52

1 Introduction

The outbreak of the coronavirus resulted in a health crisis and a drop in economic activity that was without precedent in recent history. In the context of the COVID-19 pandemic crisis, the recovery pace of the world's economies depends

on the policies that governments and companies have taken and will continue to take. Thus, the pandemic has elevated the need for fiscal policy action to an unprecedented level.

The health and economic crisis caused by COVID-19 provides a strong rationale for temporary government support for firms. Some sectors have been hit particularly hard (e.g. airlines and restaurants), but the damage is propagating throughout all sectors and economies.

Countries around the world have adopted various forms of support. In the case of measures taken to support businesses, the main types are: revenue measures in order to provide liquidity relief to firms that may face difficulty in paying taxes and other costs; expenditure measures with the objective to help the affected companies to pay for wages and other liquidity needs, such as wage subsidies (to preserve the employer-employee relationship), transfers, or more general liquidity support to firms; government guarantees; subsidised loans provided directly by governments to companies with liquidity pressures; use of extrabudgetary funds (EBFs) managed by the public authorities (e.g. the French Solidarity Fund or Germany's economic stabilisation fund, and WSF).

According to the European Commission (European Commission, 2020, April 14), the policy measures taken against the spread and impact of the coronavirus should be classified into the following categories: expenditure measures; tax measures; sectorial, regional, or measures other than fiscal; any other measures.

In most cases, these measures concerned the granting of technical unemployment, the postponement of tax payments, and the suspension or postponement of loan instalments or their maturity.

Even if only 1 year has passed since the beginning of the outbreak in almost all countries of the world, there are an important number of papers who authors investigated the impact of COVID-19 crisis and the measures taken (Baldwin & Di Mauro, 2020; Barua, 2020; Cheng, 2020; Elgin, Basbug, & Yalaman, 2020; Siddik, 2020), but without definitive conclusions regarding the efficiency of the applied measures in short-time. Even if the important

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role played by the automatic fiscal stabilisers is known (Bouabdallah et al., 2020; Crespo Cuaresma, Reitschuler, & Silgoner, 2011; Dolls, Fuest, Peichl, & Wittneben, 2019; In't Veld, Larch, & Vandeweyer, 2013; Mohl, Mourre, & Stovicek, 2019), the present study analyses the effects of the discretionary measures taken by national authorities in European Union (EU) member states in cushioning the economic shock caused by the pandemic. All these measures implemented by the European governments were necessary because according to Bouabdallah et al. (2020), the effectiveness of automatic fiscal stabilisers in counteracting the economic shock is less apparent during the COVID-19 crisis, especially during the lockdown phase.

The objective of this research is to investigate especially the tax and expenditure measures that EU countries have introduced in response to the COVID-19 crisis in order to support the affected economies. First, we want to highlight the impact of COVID-19 crisis on economic growth (measured by GDP growth) and then to study if the measures taken by all countries were capable to counteract in a short period of time, during the negative impact of COVID-19 crisis, by analysing the evolution of some relevant indicators for economic situation (economic growth, public debt, and budgetary deficit) during this time with a focus on the quarters of 2020.

The analysis of the measures taken by different states is useful and important for establishing which are the best practices. The contribution of the article consists in filling the literature gap by investigating the effects of the COVID-19 crisis and the role of fiscal-budgetary measures taken by EU countries in order to counteract the negative effects of the pandemic.

The structure of the article consists of six sections. Section 2 provides an overview of the adopted measures and their impact. Section 3 reviews the literature regarding the role of fiscal policy to counteract the economic crisis. Section 4 explains the data source used and presents the main descriptive statistics of the sample and the methodology employed. Section 5 is dedicated to the presentation of the main results and discussions. Finally, we end by concluding the most relevant results.

2 Overview on Fiscal-Budgetary Measures Adopted by EU Countries in the Context of COVID-19 Crisis

According to the Report of European Fiscal Monitor (EU Independent Fiscal Institutions, 2021), the EU 27 countries

introduced over 1,000 budgetary measures to counter the effects of the pandemic in 2020 and/or 2021. The size of the fiscal measures amounted to 5% of GDP in 2020 and 2% of GDP until March 2021, but the fiscal policies for stimulating EU economies will increase in 2021, if new measures will be adopted or current support measures will be extended. Comparing with the 2009 global financial crisis, the overall amount of discretionary stimulus in EU countries amounted only around 1.5% of GDP (Haroutunian, Osterloh, & Sławińska, 2021), which highlights the higher impact of the COVID-19 crisis on the economy and budgetary position. Another difference between these two crises consists in the heterogeneity of the measures, and also regarding the dimension of the measures, because during the global financial crisis were EU member states where stimulus measures reached over 3% (in the case of Luxembourg), while some countries did not provide any stimulus at all.

There are a number of important measures (as we can see in the Communication of European Commission – (European Commission, 2021, February 12) and it is not our objective to present every measure, but to resume it.

The degree of policy targeting varied across countries, sectors, and businesses, because in some countries, the measures were available to all firms, but in other countries, the measures were granted to specific sectors (e.g. tourism and commercial air travel) or to companies that have experienced a significant drop in revenues (in this case, the taxpayers had to prove the revenue decrease to the tax authority). Also, there are few countries, where the companies received government support only if they asked for it. On the other hand, there are countries that offered support to small and medium sized enterprises (SMEs) or self-employed businesses considering that these businesses will face higher liquidity constraints than others.

An overview of the fiscal-budgetary measures reported by national authorities is presented in Table 1. The measures differ by country, but from a total number of 566 measures, the most common are public guarantees (used by all member countries), direct grants (used by 30), tax deferrals (29) and loan moratoria (25).

Table 2 reveals the size of the most important fiscal-budgetary measures on 30 September 2020. The nominal value of the government support packages related to the pandemic and reported by national authorities represented more than 2,400 billion euros (around 14% of 2019 GDP). Also, in this case, the high amount of money (without moratoria) is dedicated to public guarantees (1,580 billion euros), direct grants (327 billion euros), public support for credit insurance (227 billion euros), and tax deferrals (170 billion euros).

Table 1: Types of fiscal-budgetary measures

	Loan moratoria	Public guarantees	Public loans	Equity participation	Direct grants	Tax deferrals	Tax relief	Public support for trade credit insurance
Country	25	31	16	8	30	29	20	9
AT	2	1			2	2		
BE	3	2			8	4	2	
BG	1	3			5	1	2	
CY	2	3	1		10	2	4	
CZ	1	4			17	1	5	
DE	3	4	5	2	5	3	9	1
DK		4		2	5	2		
EE	1	3	4	1	4		1	
ES	4	7		2	8	7	6	1
FI		1			6	1		
FR	1	1			2	1		1
GR	5	2	2		26	5	2	
HR	3	2	2		1	5	7	
HU	5	2	2		7	1	6	1
IE	1	3	5	1	22	1	7	
IS	1	3			5	2	5	
IT	6	9		1	2	1	3	2
LI		1			2	1		
LT	2	4	4	1	7	2		
LU	1	3	2		1			
LV	1	2	1	1	3	1		1
MT	1	1			7	2	2	
NL	3	5			7	1		1
NO		3			3	6	4	
PL	2	4	3		1	8	13	
PT	4	1	2		3	2	1	2
RO	4	1	1		1	4	2	
SE		2	1		7	2	1	
SI	1	2	1			7		
SK	2	6			3	3		
UK		3	2		10	3	1	1
Number of measures	60	92	38	11	190	81	83	11

Source: ESRB Working Group Members (2021, p. 53).

Table 2: Amounts of fiscal-budgetary measures provided for period Q4 2020–Q4 2021, September 2020

Types of measures	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Percentage of measures with no end-date available	Total amount of measures (EUR billion)
Moratoria	17%	22%	0.4%	5%		55%	838
Public guarantees	63%	2%	21%		3%	11%	1,580
Public loans	93%				0.4%	6%	57
Direct grants	51%	6%	3%		9%	32%	327
Tax deferrals	10%	28%	14%			49%	170
Tax relief	45%	14%	4%		19%	18%	75
Public support for credit insurance						227	
Total (EUR billion)	1,411	293	368	44	90	1,067	3,274
Total without moratoria (EUR billion)	1,270	109	364			693	2,436

Source: ESRB Working Group Members (2021, p. 55).

Regarding the budgetary measures on the revenue side, Table 3 provides an overview of the tax policy measures that EU countries have implemented in response to the COVID-19 pandemic. Thus, the table highlights the types of tax that have been reformed for each EU country during the immediate crisis phase. In this context, we can notice that the personal income tax (PIT), corporate income tax (CIT), and value added tax (VAT) have been the most reformed taxes.

Regarding the expenditure side of the budgetary measures, we extracted the policy measures from the Report of

IMF (IMF Fiscal Affairs, 2020) and we highlighted for the case of EU countries. The most common measures (Table 4) were providing support through direct lending, loan guarantees, capital injection (in Italy), and deferral of utility and rent payments (France and Spain). In some EU countries, the support provided in the form of wage subsidies (Austria, France, Denmark, Estonia, Ireland, and Italy) is also mentioned.

It is considered that expenditure measures are more effective for offering targeted support to firms particularly hard hit by the crisis, having difficulties in accessing the

Table 3: Tax policy measures in EU, by tax type

Country	Personal income tax (PIT)	Corporate income tax (CIT)	Social security contributions (SSCs)	Property taxes	Value Added Tax (VAT)	Other consumption taxes	Other
Austria							
Belgium							
Bulgaria							
Croatia							
Cyprus							
Czech Republic							
Denmark							
Estonia							
Finland							
France							
Germany							
Greece							
Hungary							
Ireland							
Italy							
Latvia							
Lithuania							
Luxembourg							
Malta							
Netherlands							
Poland							
Portugal							
Romania							
Slovak Republic							
Slovenia							
Spain							
Sweden							

Source: author elaboration from OECD (2020). Overview of Country Tax Policy measures in response to COVID-19 crisis. Retrieved from: <http://www.oecd.org/tax/tax-policy/#d.en.194478>.

Table 4: Expenditure policy responses to COVID-19 outbreak

Measures	Targeted population	Targeting method	Countries/regions
Supporting businesses			
Loans, guarantees, and capital injection	Hard hit businesses	Place-based targeting SMEs directly or institutions that they worked with	Italy Italy and Spain
Deferral of payments such as utilities, rents, or taxes	Hard hit businesses	SMEs	France and Spain
Preserving employment linkages			
Wage subsidies	Workers facing layoffs or reduction in hours	For workers whose wages are below a certain level	Austria and France
	Workers facing layoffs or reduction in hours	Typically targeted at certain firms or workers to keep fiscal cost low	Denmark, Estonia, and Ireland
Employment and wage restrictions	Workers facing layoffs or reduction in hours	Universal	Italy

Source: International Monetary Fund (IMF) Fiscal Affairs (2020). Expenditure policies in support of firms and households.

financial system, or not included in the tax system. Also, it is important to mention that these types of expenditure support are typically temporary and for short-term.

Resuming, governments offered support to address the economic and social challenges of the COVID-19 crisis, and they are using fiscal measures that take various forms: transfers or liquidity support and wage subsidies as most common from the side of expenditure policy, and tax deferrals, as the most applied measure from the side of tax policy.

European Commission estimated the cost of these measures (Table 5) taken by EU member states at 3.8% of GDP in 2020 for the discretionary fiscal measures, which are added to the impact of automatic stabilisers estimated at around 4% of GDP in the same year (European Commission, 2021, March 3). From the side of expenditure measures, the expenditure measures in other

areas (compensations to specific sectors for income losses, as well as short-time work schemes) represented 2.7% of GDP, while the tax relief measures accounted for 0.4% of GDP. Also, the EU countries offered important liquidity support (around 19% of GDP), mostly in the form of public guarantees.

There have been similarities as well as differences between fiscal packages across EU countries. The measures introduced to support businesses have been fairly similar across countries, with a strong focus on tax payment deferrals and transfers to firms. Thus, in the run-up to normality, fiscal policies will continue to play a key role and could undergo major changes globally. The differences between countries come from the number of discretionary measures. According to the European Fiscal Monitor (EU Independent Fiscal Institutions, 2020), Lithuania has the largest relative amount of discretionary

Table 5: Overview of national fiscal-budgetary measures in response to the COVID-19 pandemic

	2020		2020–2021		2020–2022	
	bln EUR	% of GDP	bln EUR	% of GDP	bln EUR	% of GDP
EU 27						
A. Measures with a direct budgetary impact	497.8	3.8	364.7	2.6	83.1	0.6
1. Expenditure	438.5	3.3	322.2	2.3	65.9	0.4
a) Health care	80.8	0.6	58.9	0.4	14.9	0.1
b) Other	363.0	2.7	264.5	1.9	52.3	0.4
2. Revenue	59.3	0.4	42.5	0.3	14.1	0.1
B. Automatic stabilisers		±4				
C. Liquidity measures without a direct budgetary impact	2505.9	18.9				
1. Tax deferrals	206.5	1.6				
2. Public guarantees (available framework)	1877.0	14.2				
3. Others	422.4	3.2				

Source: European Commission (2021, March 3). One year since the outbreak of COVID-19: fiscal policy response.

measures (about 21% of GDP), about 20% of which are fiscal expenditures and about 1% of tax relief. Austria (12% of GDP), Cyprus (10%), Germany (11%), and Sweden (12%) are the four other countries that have so far committed more than 10% of GDP in direct expenditures. The smallest packages of discretionary measures were introduced in Bulgaria (2.1%), Romania (1.7%), and Slovakia (1.5%).

COVID-19 had a major economic and budgetary impact on European countries. Economies shrank rapidly in 2020 and the recovery remains incomplete. Governments have responded with large-scale spending measures, particularly to support employment and household incomes, as well as allowing automatic stabilisers to operate (EU Independent Fiscal Institutions, 2021). Of course, the impact of all these measures will vary across countries and across time and will depend on the effectiveness of the policy responses taken to limit the economic impact of the crisis and on international transmission channels (OECD, 2020).

3 Literature Review

This section is intended to establish a foundational view of the study's topic, based on the review of literature. It is divided into two areas of interest, the first highlights the role of fiscal policy for stabilising economies affected by crisis and the second discusses the efficiency of the fiscal stimulus programs implemented by governments around the world to overcome the repercussions of the COVID-19 pandemic.

Regarding fiscal policy, in the theoretical and empirical literature there is a consensus about its role in the stabilisation of economic activity affected by recession (Arestis, 2012; Coenen, Kilponen, & Trabandt, 2016; Fuss, Whalen, & Hill, 2020; Mehrotra, 2018; OECD, 2009), which represents the main concern of this study. The fiscal policy exercises the stabilisation function through its instruments (taxation or government expenditure) and its effectiveness, reflected in the change in output, and can be measured by fiscal multipliers, namely spending and tax multipliers.

With regard to fiscal multipliers there is an important number of studies which discuss their efficiency in different conditions, such as normal condition or crisis condition as it was in the 2008 global financial crisis when the discussion about the efficiency of fiscal measures to overcome the crisis and to improve the growth of the economy became a main topic in the research papers.

Thus, under normal circumstances, fiscal multipliers may be around unity for government spending and about

half (0.5) for tax measures, although in the case of open economies the values of this multipliers register lower values. The OECD Report (OECD, 2009) mentioned that in the context of the global crisis, it was difficult to dimension the effectiveness of the fiscal policy in boosting activity, measured by fiscal multipliers. Even so, the OECD Report (OECD, 2009) suggested that in the first-year government spending, multiplier was slightly greater than unity, while the tax cut multiplier was around half of that. This means that public expenditure, namely public investment, has the largest multiplier and the greatest impact on the economic growth in short-term, higher than that of tax cuts or direct aid to households, this finding was also supported by Coenen et al. (2016). In the case of tax cuts, the fiscal multiplier could be greater and the measures will be most effective if these measures are targeted at households that are likely to be liquidity-constrained.

In 2008 global financial crisis, the majority of fiscal measures taken to stimulate the economy were aimed at supporting household purchasing power, either by increasing income, reducing taxes, or providing benefits to stimulate consumption. The expected effect (increase in consumption which had to stimulate companies to increase their supply accompanied by the increase in the employment rate) did not occur because the increase in uncertainty about future income and higher risk of unemployment determined people to be more cautious and they preferred not to increase consumption but to increase savings (OECD, 2009).

In the current context characterised by COVID-19 crisis, the measures consisting of targeted transfers to certain households, such as low-income families or the unemployed, seem to have a stronger impact as they target households with a higher propensity to consume (Siddik, 2020).

Compared to global financial crisis from 2008, when fiscal packages were expansionary in most OECD countries but also restrictive in few countries (Hungary, Iceland, and Ireland) (OECD, 2009), in the context of COVID-19, governments applied only expansionary fiscal packages, considering the impact of expansionary fiscal measures on the economic activity, as was highlighted in the literature (Bouabdallah et al., 2020; Coenen et al., 2010, 2016; Crespo Cuaresma et al., 2011; Fuss et al., 2020; In't Veld et al., 2013).

Fiscal policy is a strong macroeconomic stabilisation instrument, especially when it is coordinated with monetary policy and also with financial stability policies (Arestis, 2012). Recent studies regarding fiscal multipliers showed that (directly relevant in the context of discretionary

measures) most model-based estimates for a 1-year temporary fiscal shock with no monetary policy accommodation hover around 1 for expenditure items such as government consumption and investment and are much lower, i.e. between 0.2 and 0.4 for general transfers and (direct and indirect) taxes. (Bouabdallah et al., 2020). This means that fiscal multipliers are conventionally higher when monetary policy reaches the lower bound or the nominal interest rate is kept constant for a prolonged period of time (Christiano, Eichenbaum, & Rebelo, 2011, February; Coenen et al., 2010).

The 2008 global financial crisis determined the researchers to question about the effectiveness of fiscal stimulus – additional government spending and/or tax relief – to mitigate the impact of a recession and stimulate economic recovery of the affected economies. The results do not converge to a single conclusion. There are studies (Barro & Redlick, 2011; Karabegović, Lammam, & Veldhuis, 2010; Ramey, 2011; Taylor, 2018) showing that stimulus package during the 2008–2009 recession failed to increase consumption and had little to no effect on economic growth. The explanation consists in the uncertainty about the private sector's response to temporary fiscal actions and thus the response of the economy to fiscal impulses (Coenen et al., 2016).

Contrary to these findings, Coenen et al. (2016) affirmed that the response of output to temporary fiscal stimulus measures depends on many factors, such as the type of fiscal instrument, the persistence of the fiscal stimulus, and the reaction of the monetary policy. Thus, fiscal measures which directly stimulate government consumption and investment or targeted transfers conduct to higher fiscal multipliers than tax cuts in the short run. Moreover, temporary and well-targeted expansionary fiscal measures on the side of expenditure which increase can be relatively effective in stimulating the economy.

In this context, there is an agreement on the fact that fiscal measures have to be temporary and well targeted. Applying fiscal stimulus for a large period of time can lead to a persistent deterioration of the fiscal balance and less efficiency of the fiscal multipliers. According to Alesina, 2012, if this will occur, then it would be necessary to reduce government spending for reducing fiscal deficits following a recession. In other words, governments have to reduce their debt to GDP ratios in economically favourable times (after recession period) to give themselves fiscal space when stimulative actions are needed in a more difficult economic environment (Coenen et al., 2010), like this one determined by the sanitary crisis.

Taking into account the lessons learned from 2008 global financial crisis, in the context characterized by

COVID-19 epidemic, the authorities applied budgetary measure on both the revenue side and expenditure one.

One of the papers by Cifuentes-Faura (2021) analysed the virus containment measures carried out by the EU countries most affected by the pandemic. His study comprised 11 EU countries (Austria, Belgium, Czech Republic, France, Germany, Greece, Hungary, Italy, Poland, Portugal, and Spain) and United Kingdom. The author investigated if the countries that anticipated taking restrictive measures managed to minimise the impact of the pandemic. His results showed that in the case of these countries, the impact was smaller. According to this result, Cifuentes-Faura (2021) proposed as solution the adoption of an expansive fiscal policy scenario, in line with a Keynesian vision, accompanied by an investment plan, which can contribute to a fall in unemployment and to economic recovery.

Other authors (Razumovskaia, Yuzvovich, Kniazeva, Klimenko, & Shelyakin, 2020) tried to analyse the effectiveness of the adopted measures in the context of the COVID-19 pandemic only for those measures related to SMEs. Thus, using the Granger test and correlation analysis, they developed a cognitive – econometric model for assessing the effectiveness of the Russian governmental policies to support enterprises in the context of the pandemic situation. From the applied measures, the state funding resulted to be more effective and capable of restoring business activities of SMEs, but in order to obtain this result the volume of state funding should increase by 1.89–1.98 times. Also, the authors highlight the fact that the government should continue to implement measures, such as tax, administrative, banking, and financial support for SMEs to help them to deal with the negative impact of the COVID-19 pandemic.

In another study, (Nikolajenko, Viederytė, Šneiderienė, & Aničas, 2021) the efficiency of the Lithuanian government intervention measures intended to support businesses affected by the first lockdown regime, which took place from 16 March, 2020 to 16 June, 2020, was examined. They obtained different results depending on who judged them. Thus, from the side of the initiator of the measure, the result was that the government's actions were efficient, but from the point of view of the beneficiary, the efficiency was insufficient.

A more comprehensive study (Vasiljeva et al., 2020) intended to develop a predictive model for assessing the impact of the COVID-19 pandemic on the economies of Eastern Europe. The countries included in the study were Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Romania, Russia, Slovakia, and Ukraine. In their model, Vasiljeva et al. (2020) considered the opinion of

leading rating agencies, which estimated that the economies of developing countries are more vulnerable to a deeper recession than those in the developed market. Thus, using this model they determined quantitative estimates of economic development, especially, changes in GDP growth rates over a period of 1 year, which makes it possible to determine and build strategies of economic management for a long period of time, in contrast to tactical forecasting models.

Considering all the aspects mentioned above, we can assert that the fiscal measures were necessary to overcome the negative economic effect of the sanitary crisis and even if they were efficient, counteracting immediately the pandemic-related output loss and sustaining the recovery. Next the analysis conducted will assess its effectiveness.

4 Methodology

4.1 Data

Considering the objective of this study, we analysed the macroeconomic and fiscal key indicators for EU countries for the period of 2000–2020, mainly GDP growth (% change in previous period), public debt (% from GDP), and Government balance (% from GDP). We extracted the data from Eurostat database as quarterly values (European Commission, 2021).

As expected, the COVID-19 pandemic had an immediate and very high effect on the economic growth. In 2020, the economic decrease was much higher than the value recorded during the global crisis period, 2008–2009 (Figure 1). Thus, during the 2008 crisis, EU 27 countries

recorded a decrease of 2.9% in Q1-2009, but in 2020 – Q2, due to the lockdown measures taken by European countries, GDP recorded a decrease of 11.4%.

This highlights the fact that after the economy suffered a sharp economic decline in Q1–Q2 of 2020, it then quickly recovered in Q3 and Q4, this evolution was confirmed also by the forecast of European Commission (European Commission, 2021, February 11).

In order to emphasise the impact of COVID-19 on GDP growth, in Table 6 are presented, comparatively, the values (average, minimum, and maximum) registered for year 2020 and the values (average, minimum, and maximum) registered in the precedent two decades (2000–2019).

In this context, trying to come with measures, which would decrease the pandemic effects, most countries applied appropriate fiscal and budgetary actions starting in the second part of Q1-2020 (EU Independent Fiscal Institutions, 2021).

The main direction of most countries was to increase the budgetary expenses, especially for health, which led to an increase in public debt (Figure 2). This increase in public debt is most visible starting with 2020-Q2.

According to Eurostat (Eurostat, 2021, February 10), the highest increase in public debt was recorded in Cyprus from 94% in 2019-Q4 to 119.5% in 2020-Q3. Similar increase is noticed in Italy (134.7% in 2019-Q4 to 154.2% in 2020-Q3), Greece (180.5% in 2019-Q4 to 199.9% in 2020-Q3), and Spain (95.5% in 2019-Q4 to 114.1% in 2020-Q3). On the other side, the smallest increases were recorded in Sweden (35.1% in 2019-Q4 to 38.4% in 2020-Q3), Luxembourg (22.0% in 2019-Q4 to 26.1% in 2020-Q3), and Ireland (57.4% in 2019-Q4 to 62.0% in 2020-Q3).

Increasing the public expenditure, but at the same time, also considering the decrease in income revenue

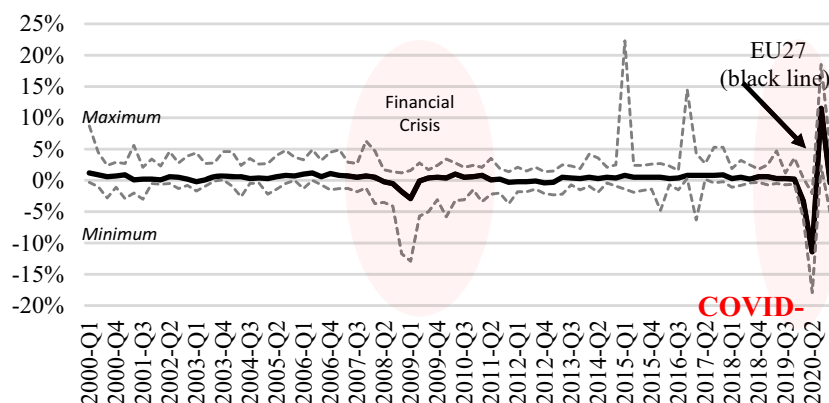


Figure 1: GDP evolution (% change in previous period) by quarter (2000–2020). Source: Authors' elaboration based on data from Eurostat. Legend: Maximum–maximum value recorded within EU countries. Minimum–minimum value recorded within EU countries. EU 27 – average at EU 27 level.

Table 6: Descriptive statistics for GDP growth

Country	2000–2019			2020		
	Average (%)	Min (%)	Max (%)	Average (%)	Min (%)	Max (%)
EU 27	0.37	–2.90	1.20	–0.90	–11.40	11.50
Euro area	0.32	–3.10	1.20	–0.90	–11.70	12.40
Austria	0.39	–2.30	1.60	–1.15	–10.70	11.80
Belgium	0.41	–2.20	1.50	–0.93	–11.80	11.60
Bulgaria	0.97	–3.90	8.70	–1.35	–10.10	4.30
Croatia	0.50	–4.80	3.70	–1.40	–15.40	8.20
Cyprus	0.61	–2.80	4.00	–0.83	–13.10	8.90
Czech Republic	0.71	–3.40	2.70	–1.03	–8.70	7.10
Denmark	0.35	–2.40	3.00	–0.58	–6.80	5.20
Estonia	0.96	–11.70	4.00	–0.43	–5.20	2.50
Finland	0.38	–6.50	2.80	–0.40	–4.30	3.20
France	0.33	–1.70	1.00	–0.58	–13.50	18.50
Germany	0.32	–4.70	2.20	–0.73	–9.70	8.50
Greece	–0.01	–5.80	3.30	–2.93	–14.10	2.30
Hungary	0.65	–4.30	2.30	–0.63	–14.50	11.00
Ireland	1.24	–6.30	22.30	0.18	–5.10	11.80
Italy	0.08	–2.80	1.40	–1.13	–13.00	15.90
Latvia	0.88	–5.70	5.60	–0.33	–7.00	6.90
Lithuania	1.04	–12.90	4.40	–0.15	–6.20	6.10
Luxembourg	0.75	–3.20	5.10	0.50	–7.30	9.30
Malta	0.99	–3.40	4.50	–1.20	–14.20	8.00
Netherlands	0.36	–3.60	1.50	–0.58	–8.50	7.80
Poland	0.92	–1.50	4.60	–0.53	–9.00	7.90
Portugal	0.22	–2.50	2.20	–1.10	–13.90	13.30
Romania	0.99	–4.10	4.70	–0.15	–12.20	6.10
Slovakia	0.95	–9.50	6.30	–0.40	–8.30	11.60
Slovenia	0.61	–4.40	2.20	–0.93	–10.10	12.20
Spain	0.44	–2.60	1.60	–1.60	–17.90	16.40
Sweden	0.55	–3.80	3.40	–0.43	–7.60	6.40

Source: Authors' calculation based on data from Eurostat.

(due to the fact that many businesses registered a decrease in their activity or even a shutdown), led to an increase in the budgetary deficit (Figure 3). There are several countries which in Q2-2020 recorded an increase in budgetary deficit (% from GDP), such as the case of Spain (–19.5%), Poland

(–17.1%), Slovenia (–17.0%), Austria (–16.0%), and Belgium (–15.3%), based on data retrieved from Eurostat (Eurostat, February 15).

In the context of COVID-19 pandemic crisis, the budgetary deficit at EU 27 level has recorded the highest

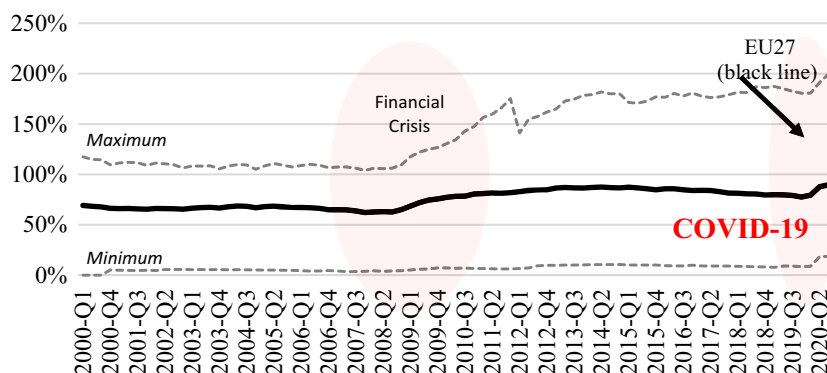


Figure 2: Public debt (% from GDP) evolution by quarter (2000–2020). Source: Authors' elaboration based on data from Eurostat. Legend: Maximum–maximum value recorded within EU countries. Minimum–minimum value recorded within EU countries. EU 27 – average at EU 27 level.

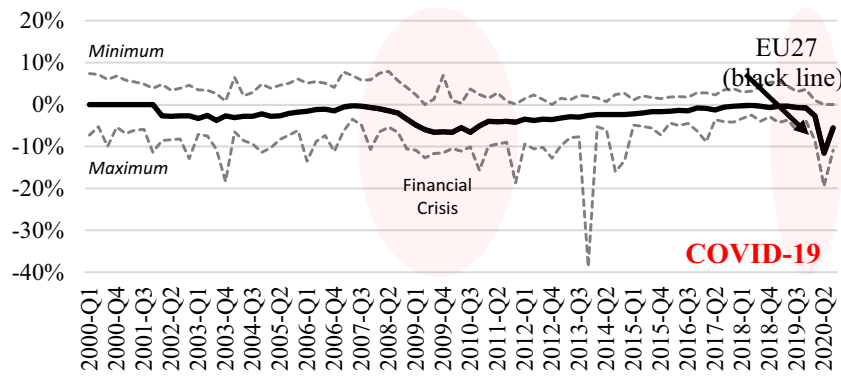


Figure 3: Budgetary deficit (% from GDP) evolution by quarter (2000–2020). Source: Authors' elaboration based on data from Eurostat. Legend: Maximum–maximum value recorded within EU countries. Minimum – minimum value recorded within EU countries. EU 27 – average at EU 27 level.

value of –11.6% in Q2-2020, while during the 2008 crisis, the highest value recorded was just –6.6% in Q3-2009, so the pandemic had a much higher impact.

In this context, it is important that the fiscal measures taken in response to the pandemic crisis be targeted and temporary and the expected improvement in the economic situation to be led by the phasing out of the emergency measures and an improvement in the cyclical situation.

4.2 Model

The descriptive statistics presented in Section 4.1 highlighted the evolution of the main macroeconomic and fiscal key indicators (GDP growth, public debt, and Government balance) for EU countries for the period 2000–2020. The objective of this study is to examine if COVID-19 pandemic had a significant impact on the GDP growth, and also, if the measures taken by EU countries were capable to counteract a part of the negative impact of COVID-19 crisis in a short time. In order to achieve this, a paired sample t -test will be applied for all EU countries and for each quarter, included

in the period of analysis, and the average (AVG) during the period 2000–2019 is compared with the average for 2020. In this case, the null hypothesis will be as follows (equation 1):

$$\begin{aligned} H_0 : \mu_{\text{Pre-Covid}} &= \mu_{\text{Covid}}, \\ H_1 : \mu_{\text{Pre-Covid}} &\neq \mu_{\text{Covid}}. \end{aligned} \quad (1)$$

Based on the hypothesis presented by equation (1), we want to see if the average for selected variable is different for these two periods.

We know that the expected mean for the difference series is 0 ($\mu_X = 0$), and the number of our sample is 27 ($N = 27$), the paired sample t -test is computed based on equation (2):

$$\begin{aligned} t &= \frac{(\bar{X} - \mu_X)}{S_X} = \frac{(\bar{X} - \mu_X)}{\sqrt{\sum (X - \bar{X})^2}} \cdot \sqrt{\frac{N-1}{N}} \\ &= \frac{\sqrt{26} \cdot (\bar{X} - \mu_X)}{\sqrt{27 \cdot \sum (X - \bar{X})^2}}. \end{aligned} \quad (2)$$

Next step is to see if the economic growth was significantly affected during COVID-19 period. In order to achieve this, a multiple linear regression is applied, based on balanced panel data for the 27 EU countries for the period 2000Q1–2020Q3. The basic model will be given by equation (3).

$$\text{GDP}_{i,t} = \alpha_0 + \alpha_1 \cdot \text{GovBalance}_{i,t} + \alpha_2 \cdot d(\text{Debt})_{i,t} + \alpha_3 \cdot \text{COVID}_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $\text{GDP}_{i,t}$ – GDP growth for country i and quarter t (percentage change); $\text{GovBalance}_{i,t}$ – the government balance for country i in year t (percentage of GDP); $d(\text{Debt})_{i,t}$ – Public debt (percentage of GDP – first difference); $\text{COVID}_{i,t}$ – dummy variable which represents the effects of COVID-19 pandemic period (Q1, Q2, Q3 – 2020) on GDP growth; α_0 , α_1 , α_2 , and α_3 – the model's parameters and $\varepsilon_{i,t}$ – error term.

Table 7: Stationarity test results

Variable	Statistic	Prob.
GDP growth (% change)	–26.5609	0.0000***
Government balance (% of GDP)	–7.7211	0.0000***
Public debt (% of GDP)	–0.0053	0.4979
1st Diff (Public debt – % of GDP)	–29.8390	0.0000***

***Indicates significance at the 0.01 level.

Source: authors' calculations.

Table 8: Independent variable correlation

Variable	Government balance (% of GDP)	1st Diff (public debt – % of GDP)
Government balance (% of GDP)	1.0000	
1st Diff (public debt – % of GDP)	–0.2505	1.0000

Source: authors' calculations.

Table 9: Paired sample *t*-test results for EU 27 countries

Variable	Average for period 2000–2019	Average for period 2020	<i>t</i> -statistic	<i>p</i> -value
GDP growth (%)				
Q1	0.56%	–2.20%	7.6883	0.0000***
Q2	0.68%	–10.19%	15.4509	0.0000***
Q3	0.60%	8.99%	–10.2529	0.0000***
Q4	0.61%	0.32%	0.7053	0.4869
Public debt (% from GDP)				
Q1	59.16%	66.21%	–2.6751	0.0123**
Q2	59.50%	73.93%	–4.9247	0.0000***
Q3	59.36%	75.92%	–5.2700	0.0000***
Government balance (% from GDP)				
Q1	–1.44%	–2.19%	1.8678	0.0723*
Q2	–1.41%	–8.47%	7.7674	0.0000***
Q3	–1.45%	–4.27%	6.0658	0.0000***

***, **, * – the null hypothesis rejected at 1, 5, and 10% significance level.

Source: authors' calculations.

The model will be estimated, using least square method (LS) based on balanced panel data (Cross-section random effects).

Through the regression model, we have to capture all the characteristics of the GDP growth, public debt, and Government balance (time series) and we applied the

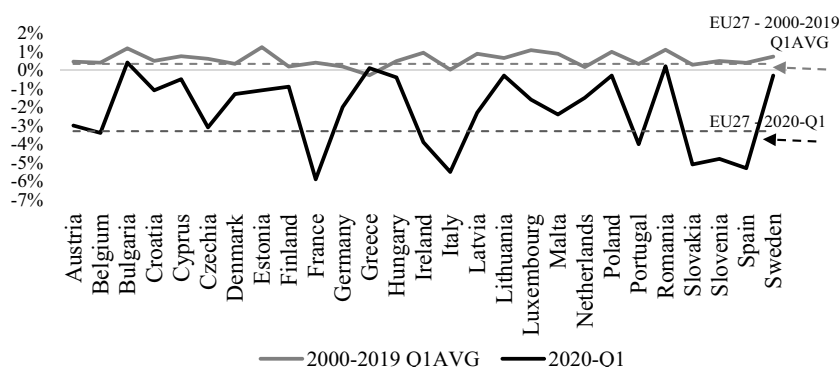
Levin-Lin-Chu panel unit root test (Levin, Lin, & Chu., 2002) to see if the time series are stationary. According to the results (Table 7), all series are stationary.

In order to prevent multicollinearity, we calculated the correlation between the independent variable (Table 8). The correlation is less than 0.3, so we can say that there cannot be any issue regarding the multicollinearity. Indeed, we will also try to estimate a separate model, by including each time just one independent variable from these two.

5 Results and Discussion

Based on the paired sample *t*-test, for which the results are presented in Table 9, it is important to notice that only the GDP growth recorded in Q4 is not significantly different for the EU countries. Again, the test is confirming that from statistical point of view, the average GDP growth for EU countries in Q1, Q2, and Q3 of 2020 is significantly different compared with each corresponding Q for the period 2000–2019.

Due to small sample size, the results from the paired sample *t*-test are weak. Even so, because data of 2020 is a special scenario data, we wanted to point out that the obvious difference between 2020 and the precedent two decades is also significant from statistical point of view.



Source: Authors' elaboration based on data from Eurostat.

Figure 4: Q1-GDP evolution for EU 27 countries. Source: Authors' elaboration based on data from Eurostat.

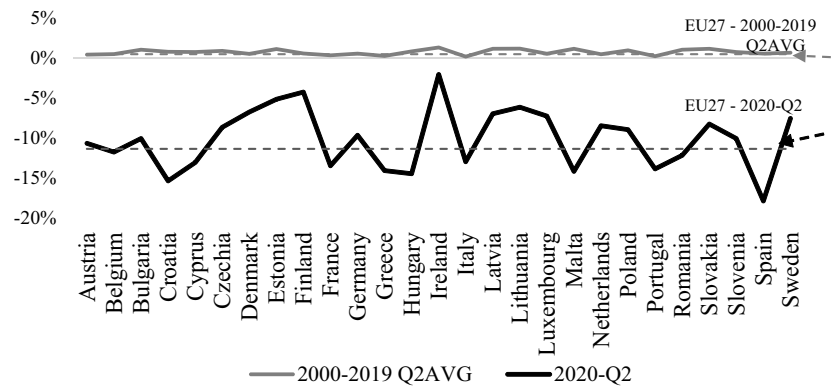


Figure 5: Q2-GDP evolution for EU 27 countries. Source: Authors' elaboration based on data from Eurostat.

Regarding the other two key indicators, for both, the significance for Q1 is smallest, but for Q2 and Q3 it is clearly a significant statistical difference between historical average and the average recorded in 2020. If the average for period 2000–2019 for public debt was around 59% in 2020, the average increased to 66% in Q1, and more than 73% in Q2 and Q3.

Going further, Figures 4–7 present the GDP evolution for each quarter for all EU 27 countries, in order to see the

discrepancies between the average recorded in period 2000–2019 and 2020.

Q1-2020 starts with a small decrease in GDP growth for all European countries. This is the time when COVID-19 crisis just started in Europe, so the effect was not so significant for all countries.

In Q2-2020, the decrease in GDP continues and becomes much higher than the average recorded in Q2 for the period 2000–2019. In the second quarter of 2020, almost all the

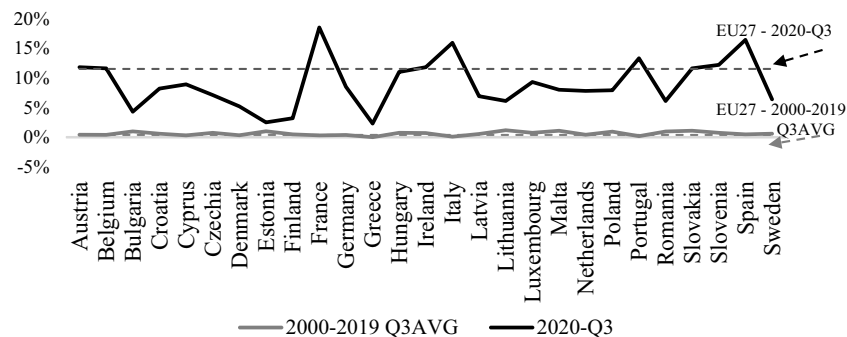


Figure 6: Q3-GDP evolution for EU 27 countries. Source: Authors' elaboration based on data from Eurostat.

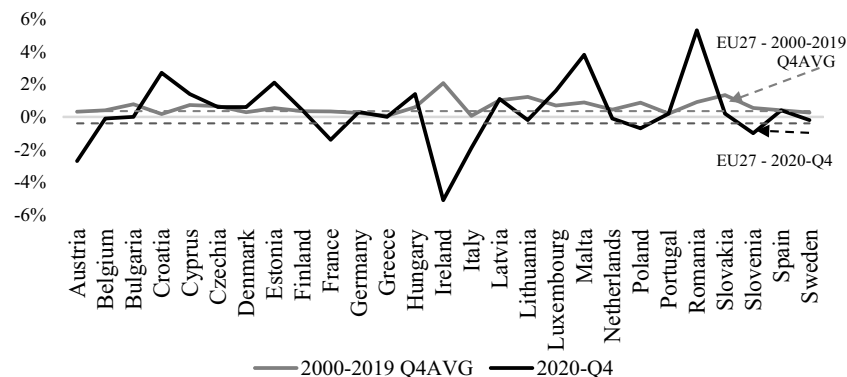


Figure 7: Q4-GDP evolution for EU 27 countries. Source: Authors' elaboration based on data from Eurostat.

Table 10: Regression models' estimation

Variable	Model 1	Model 2	Model 3
Constant	0.0075*** (0.0006) ^a	0.0079*** (0.0006)	0.0063*** (0.0006)
Government balance (% of GDP)	0.0845*** (0.0152)	0.1269*** (0.0152)	
1st Diff (public debt – % of GDP)	–0.1888*** (0.0164)		–0.2091*** (0.0162)
COVID	–0.0077*** (0.0024)	–0.0131*** (0.0024)	–0.0098*** (0.0023)
<i>R-squared</i>	0.1037	0.0520	0.0915
<i>No. of cases</i>	2,214	2,214	2,214

Source: authors' calculations.

^a(standard errors in parentheses).

***Indicates significance at 0.01 level.

European countries had lockdown periods with very strict measures regarding the people movement, but economic activities were also performed.

Of course, after such drastic period, each country tried to come with specific measures in order to relaunch the economy and to mitigate the negative impact of COVID-19 pandemic. In this context, in Q3-2020, a significant increase in GDP, which also continues in Q4, at a lower level (Figure 7) can be observed and it can be said that the taken measures might have had a contribution in this direction. This finding is in line with those of (Haroutunian et al., 2021), who affirm that the emergency measures implemented at the start of the COVID-19 crisis strongly counteracted the pandemic-related output loss and speeded up the recovery.

Based on equation (3) presented in Section 4.2, three regression models will be estimated. Model 1 will include all independent variables, model 2 will exclude Public debt variable, while model 3 will exclude Government balance (% of GDP). Estimation results are presented in Table 10.

The first model, which considered all three variables (Government balance, Public debt, and COVID crisis), highlighted that GDP growth is significantly affected by all of the considered variables. The same level of impact is registered when applied to Model 2 and Model 3, in which the COVID crisis negatively affects the GDP growth.

We can resume that all models reflect the same conclusion: COVID-19 pandemic period had a significant negative effect on GDP growth. Considering also the *t*-test results presented previously, we certainly can say that this pandemic period affects and will continue to affect the economic environment in almost all EU countries during the next period.

We are aware of the main limitation of our results, the time frame used in the analysis is not large enough in order to be able to provide assertive conclusions. The same problem was raised by Hale, Petherick, Phillips, and Webster (2020) who stated that as governments continue to respond to COVID-19, it is imperative to study what measures are effective and which are not. Despite this, the present study tried to bring some first evidence in the literature on COVID crisis effects and main fiscal-budgetary measures taken to counteract the negative impact of the crisis and can be useful to develop studies that analyse these aspects according to the disease evolution.

6 Conclusion

The article investigates the impact of COVID-19 pandemic crisis on economic growth. More specifically, the article focused on the main measures took by EU countries to counteract the negative effects of this crisis, and their effectiveness on sustaining the real economy.

To address the economic and social challenges determined by the COVID-19 pandemic, governments applied fiscal measures that take various forms and have different budgetary and debt-related implications.

Additional spending or tax cuts result in immediate higher budget deficits. On the other hand, the support provided to companies in financial trouble through loans or equity injections does not impact budgets directly but may increase debt or require additional borrowing.

The results of this study showed that COVID-19 pandemic had an immediate and significant negative impact on the economic growth in Q2-2020, when the highest decrease in GDP growth was recorded in Spain (–17.9%), and the smallest in Ireland (–2.1%). Following this, each country came with different measures in order to diminish the negative effects and to lead to economic recovery, which happened in Q3 and Q4-2020, when we experienced a “V shape” economic recovery. Of course, this achievement was based on other costs, because as mentioned, the public debt and governmental deficit had considerably increased in Q2 and Q3-2020.

Although facing unprecedented difficulties because the current crisis bears no resemblance to what has been experienced in recent decades, developed countries have the ability to “flood” economies with money to mitigate the implications of the crisis. Instead, emerging economies, such as Romania's, have much less opportunities to provide liquidity, and dependence on global investors will increase.

Thus, policymakers must adjust the fiscal measures to the economic evolution considering at the same time the level of public debt and budgetary deficit, which are important to maintain their levels to those accepted by stability and convergence Programme.

The return to pre-pandemic GDP occurred in most EU member states at the end of 2021, while in a few others, the full recovery is expected in 2022 (European Commission, 2021, November) because those countries suffered more during the pandemic or considering the contribution of tourism, one of the sectors most affected by the COVID-19 pandemic, to the economy of these countries.

The contribution of this study consists in exploring and highlighting the immediate impact of COVID-19 crisis. Being an ongoing process, the effects of the pandemic are not fully revealed yet, but through this research, we pointed out the main economic impact and EU countries response in order to rapidly counteract a potential economic crisis.

The findings of this article are related to the findings of other papers from the literature concentrated on this topic (Cifuentes-Faura, 2021; Nikolajenko et al., 2021; Razumovskaia et al., 2020; Vasiljeva et al., 2020), which showed the immediate negative impact on the economy and also the recovery after countries implemented different fiscal and budgetary measures. The fiscal-budgetary measures for short-term proved to be efficient.

The present research has some limitations regarding data availability because the regression models considered only three quarters as a proxy for COVID-19 crisis period (Q1, Q2, and Q3-2020). As the COVID-19 crisis is ongoing, having more data can lead to more relevant results. Another main shortage of the research is the fact that the analysis identified and pointed out just the short-term effect of the fiscal and budgetary measures on economic growth, because at the moment it was not possible to identify the effectiveness of these measures on long run time frame. Also, economic policies across the EU are volatile, as governments adopt new measures, so data are accurate up to the selected deadline for data collection (third quarter of 2020).

Future research can compare data at a later period when the pandemic has stabilised, which can offer the opportunity to test more accurate, the effectiveness of the measures that were finally applied. Also, another idea to develop is to select only specific countries, the most affected by the pandemic rather, and to test the effectiveness of the adopted measures.

Conflict of interest: Authors state no conflict of interest.

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