

## ASSESSMENT OF PUBLIC DEBT DRIVERS IN THE BALKANS

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### Abstract

This study investigates the main drivers of public debt and assesses the overall debt structure in the Balkan countries. Regardless of a close to 50% average debt level, there is no immediate threat of escalation compared to developed countries. The empirical analysis leverages three advanced econometric techniques to control for cross-country specifics and potential biases due to data disruptions. Sourced from the World Bank and the International Monetary Fund, the data are of quantitative type collected from 2000-2021. Empirical evidence suggests that Real GDP Growth and Current Account balance are crucial determinants of economic performance, with political regimes also exerting a notable influence. As the time frame of the research consists of the COVID-19 pandemic, it is essential to consider structural breakdowns to avoid any coefficient biases. Unsurprisingly, the dummy variable COVID-19 depicts a significant effect as public debt increased by 2.51 percentage points once the pandemic occurred. The rest of the variables, including interest rates, government expenditure, and unemployment rate, are statistically insignificant. Empirical evidence from the present study supports the hypothesis that pursuing genuine economic development through the advocacy of domestic production and trade, coupled with the consolidation of democratic institutions, can act as a check on the spiraling growth of public debt.

### Keywords

Public debt, Economic Growth, COVID-19, Panel Data, Inflation, Balkans.

### JEL Classification

E02, E12, E62.

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### Introduction

From the sovereign debt crisis 2008 to the recent COVID-19 pandemic, the government debt stock in Europe has been perpetually accumulating, becoming the subject of political

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attention. The threshold limit of 60% of GDP set by the European Union was exceeded by Greece in 2008, where the debt overhang reached approximately 113% of the gross domestic product. The crisis had a widespread impact across Europe, but the Balkans remained relatively unaffected. With a debt-to-GDP ratio of less than 60%, except for Greece, which experienced a prolonged recession, the region's developing economies were shielded from financial globalization and lenient credit policies that caused the financial crash.

Balkan countries have been transitioning from a centralized to a market-based economy, and most aspiring to join the EU membership must meet some obligations in this regard. To meet the convergence requirements and satisfy the demands of the European Union, the authorities have significantly increased public expenditure and investments. Enhancing living standards can be challenging due to high costs often exceeding government revenues, resulting in deficits supported by public debt. This means that the government is borrowing money to cover the expenses, which can increase the country's overall debt burden.

Given the ongoing impact of the COVID-19 pandemic and the war in Ukraine, there is a genuine concern for potential economic challenges on the horizon. As a result, it is crucial to pinpoint the most effective methods to mitigate the risk of a likely sovereign crisis, even though implementing them in the immediate future may prove difficult. Therefore, it is essential to identify the debt structure and its main drivers to formalize relevant recommendations and assess its long-term sustainability.

It is evident that policymakers are keenly interested in the relationship between debt and favorable results. However, there are still gaps in the literature that need to be filled to define the threshold level of debt that generates optimal outcomes. This is one of this paper's objectives. Even though the literature suggests a negative impact of high indebtedness, the global trend continues to grow and marks around 206% of GDP (Gómez-Puig et al., 2022). From a point of view, it declines incentives to do business as investors fear an eventual increase in the future taxation rate (Bon, 2015). On the other hand, inflationary pressure is always present, considering that some government obligations must be covered by seigniorage in the absence of fiscal adjustments (Kwon et al., 2009). Nevertheless, what makes it escalate to this level?

To investigate this association, this paper employs a twenty-year panel study of Balkan countries, including Kosovo and Albania. Additionally, this study leverages quantitative methodology and aims to obtain considerable predictive power by employing three estimation methods. Each has its unique property, an essential factor in comparing the concluding coefficients. Real interest rates, the democracy index, the corruption index, the current account balance, the unemployment rate, inflation, and government expenditure are the control variables in the central relationship between debt and GDP growth.

This study aims to address the gaps in the current literature by identifying and examining the key drivers of government debt in the Balkan countries. It will also analyze the correlations between government debt and important macroeconomic indicators such as inflation, unemployment, and government expenditure. Despite the abundance of literature on government debt, there is a lack of studies that focus on the Balkan region.

Therefore, this study aims to bridge this gap by providing additional insights on the topic, making an important contribution to our understanding of government debt and its impact on economic growth in the Balkan region. Last but not least, this study addresses the direct impact of COVID-19 on public debt in need of empirical evidence from developed and developing countries.

### 1. Review of the scientific literature

Besides the aftermath of the financial crash in 2007, government debt is still a concern in the Balkans. The pandemic and inflation have increased government debt to encourage consumption and prevent economic downturns. The study by Khan (2021) on public debt in developing countries found that economic growth can reduce public debt, but political and economic factors also play a significant role. However, specific estimations are necessary for accurate recommendations (Khan, 2021).

Even though prudent fiscal balance management is deemed critical in determining public debt escalations, GDP growth must be emphasized to mitigate any potential sovereign debt crisis. Economic growth momentum is a crucial determinant of how high indebtedness should be resolved. During the economic boom, investors' behavior drove interest rates and borrowing costs down, which relaxed the fiscal system's austerity measures (Globan & Matosec, 2016).

Furthermore, public debt is hypothetically driven by fiscal policy sustainability and cyclical instances of economic development. Yet, no quantitative approach implies that when debt shocks occur, austerity measures in the fiscal system must be exercised to control debt overhang (Collignon, 2012).

Gargouri & Ksantini (2016) employed a GMM estimator, and panels corrected standard errors to find the determinants of public debt using a panel of cross-countries in the eurozone. The findings reveal a significant and negative impact of GDP growth on the debt-to-GDP ratio and an excessive significance of the first lag of public debt. The growth-debt association is consistent with the literature, which supports the hypothesis that real GDP growth and public debt are negatively correlated. As economic growth stagnates, the government turns to public debt to finance its obligations. (Apergis & Apergis, 2019; Benfratello et al., 2018; Bon, 2015; Del Monte & Pennacchio, 2020; Dzhumashev, 2014; Globan & Matosec, 2016; Khan, 2021; Pecaric et al., 2018)

Higher inflation erodes the real value of total debt if other things are held constant, and it is prejudiced to boost the nominal GDP. This depends on the debt maturity and its currency composition, whether it is denominated in local or foreign currency (Aizenman & Marion, 2011; Krause & Moyon, 2016). In addition, (2016) finds that inflation and public debt have a positive correlation, while Bon concludes that a 1% increase in inflation is associated with an approximately 3.03% decrease in the debt-to-GDP ratio. The nexus between public debt and inflation appears to have a higher impact in high-indebted and undeveloped countries. At the same time, the effect is moderated in developed and low-indebted countries. At the same time, Kwon et al. (2009) argue that the more debt surges, the more the positive wealth effect drives the overall price level. They support the opposite side of the relationship, while Forslund et al. (2011) denote that past inflationary cycles do not affect debt, regardless of cross-country specifics.

The evaluation of public debt has become outdated, as pension funds and social expenses comprise a significant portion of it. The aftermath of the financial crisis has resulted in low interest rates and lower-than-expected growth, leading to more debt issuance in response to business cycles, epidemics, and disasters. Due to government debt regulations, lenders consider it liquid in the money market, leading to oversaturation of market demands despite potential threats. The ability of future generations to offset increasing debt and taxation effects with increased savings remains uncertain and dependent on various factors, including interest rates and debt ratios.

High public debt could raise interest rates, increasing borrowing costs, reducing consumption, and shrinking investments. This argument is supported by (2004) and Ford & Laxton. After World War II, America and the United Kingdom imposed low nominal interest rates to recover the economy, and the liquidation of public debt progressed by 2 to 3 percent of GDP annually (Reinhart & Sbrancia, 2015). Del Monte and Pennacchio (2020) found that government corruption and public expenditure positively impacted public debt in a panel of OECD countries. Inflation and interest rates, however, were statistically insignificant. Apergis & Apergis (2019) found a link between corruption and public debt in 120 countries from 1995 to 2015. They used panel smooth transition regression methods and found that economic shadow exacerbates the debt-to-GDP ratio. In developing countries, exceeding public expenditure limits worsens economic growth due to institutional quality gaps (Dzhumashev, 2014). Corruption has a more substantial impact on high-income countries. It can increase public debt when combined with military expenditure and economic shadow, according to studies by Benfratello et al. (2018) and (Cooray et al., 2017). Lastly, Tarek and Ahmed (2017) find that the corruption index is significant, with a positive sign at a 99% confidence interval on public debt accumulation.

Balkan & Greene (1990) claim that autocratic regimes tend to issue more debt, estimating a negative causality between democracy and debt, while Schragger (2012) argues that being backed up by the Federal Reserve and pursuing the aim of advancing democracy and expanding opportunities, the relevant institutions have failed to alleviate state overspending. On the other hand, undeveloped and fragile democracies in their earlier stages are associated with higher debt issuance. The lack of independent and high-quality public institutions hinders fiscal consolidation during transition periods and increases demand for public services (Bittencourt, 2019; Profeta et al., 2013).

According to (2020), Del Monte & Pennacchio, Khan (2021), and Tarek and Ahmed (2017), increasing unemployment rates result in a surge of social expenditure, which can exacerbate public debt. Despite declining tax revenues, governments tend to issue more bonds to meet their obligations. Rising debt burdens future generations by shrinking private investments, deteriorating GDP growth, and increasing taxation rates, which can lower labor force incentives to work (Fedeli & Forte, 2012).

Sinha et al. (2011) studied public debt determinants in middle- and high-income countries from 1993 to 2008. They found that GDP growth and public expenditure were significant factors, while inflation, current account balance, FDI, and interest rates varied by region. Economic cycles affect debt trends differently between regions. Financial market competitiveness and stock exchange under development in the Western Balkan region led

to higher borrowing costs and exchange rate risks due to insufficient funds and the absence of capital accumulation (Ćosović, 2020). Real GDP growth and the debt-to-GDP ratio are negatively correlated, and the findings are robust in each method specifications (Bon, 2015; Ćosović, 2020; Dzhumashev, 2014; Globan & Matosec, 2016; Khan, 2021; Tarek & Ahmed, 2017). Government expenditure has a positive impact in two studies by Globan and Matosec (2016) and Khan (2021). However, the results are significant and negative in a cross-country panel that includes developing and developed countries (Apergis & Apergis, 2019). Studies show a positive correlation between corruption and public debt in developing countries (Apergis & Apergis, 2019; Benfratello et al., 2018; Cooray et al., 2017; Tarek & Ahmed, 2017). An increase in a country's current account deficit can lead to a rise in its public debt, according to Globan & Matosec (2016), and the same is expected for the inflation rate (Apergis & Apergis, 2019; Lopes da Veiga et al., 2016; Tarek & Ahmed, 2017). Lastly, Malenković (2022) discovered no significant correlation between public debt and inflation in this region.

To conclude, some authors argue that high levels of public debt can lead to a decline in economic growth, while others suggest that there is no significant correlation between debt and GDP growth. For instance, Gargouri & Ksantini (2016) found that GDP growth has a negative impact on the debt-to-GDP ratio, which suggests that higher economic growth can reduce public debt. On the other hand, Del Monte & Pennacchio (2020) did not find any significant relationship between public debt and economic growth, but they found that government corruption and public expenditure can positively impact public debt. These conflicting views suggest that the relationship between public debt and economic growth is complex and dependent on various factors such as institutional quality, government policies, and the level of corruption in the government. Another approach supports a non-linear relationship between these two indicators at different threshold levels, considering advanced and emerging markets.

## 2. Research methodology

The data employed in this research are retrieved from secondary sources from 2001 to 2021. Most of the entities have sufficient information available for variables of interest, with some exceptions in Kosovo, Albania, and Serbia. This might be a result of political developments in the last decades under a weak institutional environment that lacks transparency and accountability. Panel estimators are an ideal solution for these circumstances as they do not consider time-series interruptions. The unbalanced panel data consists of thirteen Balkan countries listed as follows: Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Greece, Hungary, Kosovo, Montenegro, North Macedonia, Serbia, Slovenia, Romania, and Turkey.

From the descriptive statistics, this region experienced positive GDP growth over the period, with Croatia recording the highest value in 2017 and Montenegro the lowest in 2020 due to the pandemic. The average public debt ratio of 53.85% is relatively low compared to the advanced economies, which sometimes quadrupled in the Balkans. The real interest rate fluctuated over the years, with Kosovo recording the highest rate in 2009 and Serbia the lowest in 2001. The average democracy percentile rank was 57.09, while the corruption index had a symmetrical distribution. In terms of current account balance,

Slovenia recorded a surplus, while Montenegro had the highest deficit in 2009. The unemployment rate was highest in North Macedonia in 2005 and lowest in Hungary in 2019. Finally, the inflation rate was highly volatile, with Serbia recording the highest hyperinflation in 2001 and Kosovo the lowest deflation in 2009. Government expenditure had the most stable parameters, with Montenegro recording the highest ratio in 2005 and Kosovo the lowest in 2008.

The standard proxy employed for defining public debt is the debt-to-GDP ratio measured annually in percentage. For economic growth, the best approximation is considered the measure of real GDP growth, while real interest rates and inflation apprehend the monetary policy implications on debt. The model encompasses a dummy variable to account for COVID-19. It is denoted by 1, the probability of success, and 0, the probability of failure. The corruption and democracy index are measured in percentile rank, both retrieved from the World Governance Indicators. The unemployment rate is the percentage of unemployed people in the labor force. The general government's final consumption is a proxy for public expenditure and includes purchases of goods, services, military expenditure, and employee reimbursement. [Appendix A](#) includes a summary table for data and data sources.

This research encompasses an unbalanced panel model from a sample of Balkan Countries from 2000-2021. The data selection is informed by previous studies that have identified the key factors influencing public debt. The multiple linear regression that captures the variability of the debt-to-GDP ratio is constructed with quantitative and secondary data retrieved from trustful sources. A static analysis is initially considered due to the inconsistency of pooled OLS and REM estimates under a dynamic specification. While POLS neglects the panel structure of data, REM hails it by recognizing all entities and the following sample heterogeneity, according to Kennedy (2008). Additionally, GMM provides unbiased and consistent estimates even when dealing with dynamic specification and endogeneity, and it is employed for a final check of the relationships after the static analysis is conducted (Hall, 2004).

The potential limitations of using Pooled Ordinary Least Squares (POLS), Random Effects Model (REM), and Generalized Method of Moments (GMM) include inconsistencies due to neglecting the panel structure, assumptions of uncorrelated unobserved heterogeneity, and requirements for a large number of time periods and strong instrumental variables to address endogeneity. GMM may also suffer from weak instrument bias and overidentification. However, the advanced methods leveraged in this section are employed to consider cross-specific variations and heteroskedastic issues and address endogeneity presence within the regression. The basic linear regression has this form:

$$public\_debt_t i = \beta_0 + \beta_1 real\_gdp\_growth_t i + \beta_2 gov\_expt i + \beta_3 dem\_index_t i + \beta_4 corruption\_index_t i + \beta_5 ca\_balancet i + \beta_6 unemployment\_ratet i + \beta_7 rirt i + \beta_8 covid\_19t i + \beta_9 public\_debt_{t-1} i + \mu_t i$$

(1)

Where:

$\beta_0$  - the constant coefficient

- $\beta_1 \dots n$  - the slope coefficient of the independent variables
- $\mu$  - the residuals distribution
- $t$  - year
- $i$  - country

It is essential to consider the coefficients' reliability before inferring from the anticipated results. Given that panel regression is subject to classical linear regression assumptions, some preliminary checks would be advisable. The estimated results are run through E-Views 10, and the findings appear robust at each estimation method, disregarding any misleading coefficients.

The robustness control supports the reliability of the anticipated coefficients and ensures that the assumptions are not violated. In most cases, there is no exerted control over the estimation techniques; variables are adjusted in their natural settings. To confirm the result's significance, the findings are summarized by utilizing three techniques, each of which has its properties. The obtained outcomes are summarized in [Appendix A](#). Generalized Method of Moments (GMM) is a statistical technique that addresses the issue of endogeneity between regressors and the dependent variable in the context of government debt analysis. This method has been exploited in several academic studies, such as those conducted by Benfratello et al. (2018), Briceño and Perote (2020), Cecchetti et al. (2010), and Del Monte and Pennacchio (2020), to name a few. Furthermore, the Random Effects Model is employed to investigate the impact of socio-political indicators on the debt-to-GDP ratio according to Aizenman & Marion (2011), Globan & Matosec (2016), and Reinhart & Rogoff (2010), whereas several authors use the pooled OLS since it is the most general estimation method in panel studies (Cecchetti et al., 2010; Cooray et al., 2017; Kumar & Woo, 2010; Profeta et al., 2013; Sinha et al., 2011).

Lastly, this section summarizes the empirical findings of this research according to pooled OLS, Random Effects Model, and Generalized Methods of Moments. Estimated parameters reveal that the results are unbiased despite the odds of potential variances arising from cross-sectional specifics. Regressor's coefficients from pooled OLS to GMM have negligible differences, and so do their probability values. In other circumstances, where the results obtained from pooled OLS differ significantly from REM and GMM approaches, it is necessary to intervene in the sample conditions. This implies that the cross-sections must be divided into non-overlapping classes according to criteria that ensure heterogeneity.

**Table no. 1. Public Debt Impact on Economic Growth**

Variables	EGLS	REM	GMM
<b>PUBLIC_DEBT</b>	-0.403131 (0.0000)***	-0.474893 (0.0000)***	-0.046023 (0.001)***

<b>RIR1</b>	0.03602 (0.6971)	-0.168475 (0.0878)*	-0.672294 (0.0000)***
<b>NPL</b>	-0.195719 (0.0375)***	-0.202522 (0.0491)**	0.153693 (0.0233)***
<b>L_RESERVES</b>	-0.062159 (0.1509)	-0.109732 (0.0719)*	-0.036306 (0.3464)
<b>L_RESERVES (-1)</b>	-	0.031509 (0.6015)	-
<b>CA_BALANCE</b>	-0.106242 (0.0284)***	-0.109502 (0.0101)**	-0.10849 (0.1304)
<b>COVID_19</b>	-1.911314 (0.0393)***	-	-4.146731 (0.0000)***
<b>UNEMPLOYMENT_RATE</b>	0.032625 (0.1153)	-	0.059425 (0.0494)***
<b>INFL</b>	0.502556 (0.0002)***	0.309597 (0.0036)***	0.049218 (0.7544)
<b>FINANCIAL_CRISIS</b>	-2.402247 (0.052)*	-	-
<b>FINANCIAL_DEPTH</b>	-0.025002 (0.3543)	-	-0.093158 (0.0000)***
<b>REAL_GDP_GROWTH (-1)</b>	-	-	-0.074877 (0.5029)
<b>FDI</b>	-0.000572 (0.9322)	-	-
<b>R-squared</b>	0.709853***	0.659285***	0.545891***
<b>Adjusted R-squared</b>	0.667298***	0.633361***	0.491179***

Note: The table reports the estimation coefficients and in parenthesis, the associated probability values. \* denote the significance at 10%, \*\* denotes the significance at 5%, \*\*\* denotes the significance at 1%.

Source: own processing

### 3. Results and discussions

Real GDP growth significantly impacts public debt at each convenient significance level. A 1% increase in GDP leads to a 0.97% decrease in the public debt ratio. When the economy is performing well, there is less need for government support. The results suggest that economic growth can predict debt-to-GDP ratios in the future, according to Apergis & Apergis (2019) and Benfratello et al. (2018).



According to recent research, the corruption index and real interest rates are not statistically significant in any of the estimation methods used (Apergis & Apergis, 2019; Benfratello et al., 2018; Cooray et al., 2017; Del Monte & Pennacchio, 2020; Tarek & Ahmed, 2017). This finding contradicts previous research, which found that the corruption index is significant and positive at the 99% confidence level. Real interest rates and corruption index do not affect Balkan's public debt, but the data accuracy in the analysis might be compromised.

According to Del Monte and Pennacchio (2020), democracy is positively linked with the debt-to-GDP ratio, while Bittencourt (2019) denotes that the impact differs between fragile and mature democracies. Despite this, the democracy index has a negative impact on public debt, with a 1% increase in the index resulting in a 0.277% decline in public debt. Balkan countries generally have low democratic governance and high corruption (Del Monte & Pennacchio, 2020).

An increase in the current account balance is associated with a negative impact on public debt. However, the two have a dynamic relationship, and the impact differs significantly between GMM and pooled OLS methods. The literature is inconsistent with this paper's findings, as the current account balance effect on public debt is positive. (Briceño & Perote, 2020; Pecaric et al., 2018; Sinha et al., 2011).

The COVID-19 pandemic immediately impacted public debt, increasing the public debt ratio by 2.5% points. However, this effect was reduced after applying the Random Effects model. The financial crisis dummy was not significant in forecasting public debt. As for the government expenditure, the non-significance could be assigned to the data inaccuracy in this region. Further, real interest rates and corruption indexes do not change public debt in the Balkans, although the accuracy of the data may be compromised.

The unemployment rate, inflation, and government expenditure appear insignificant, so the interpretation of the coefficients by chance will be ignored. However, the expectations were that these indicators would trigger the debt to increase since unemployment and rising inflation would initiate social and economic consequences. As a coordinating entity, the government ties part of these costs to its budget, although it cannot be said that the impact extends to the public debt since a part of non-emergency expenditure might be reduced.

To further support the utilization of GMM, the initial model meets one of two criteria. Specifically, the lagged public debt variable exhibits significance with a 99% confidence interval and a positive impact. This indicates a dynamic connection between the dependent variable and the ability to forecast future debt prospects based on initial values. While endogeneity was considered during testing, the diagnostic assessment excluded this hypothesis. Furthermore, the exogenous nature of real GDP growth and government expenditure was confirmed.

## Conclusions

This study aimed to assess the main drivers of the Public Debt, considering the Balkans region. Maintaining control over budget deficits and borrowing rates is crucial, especially for economies in transition, despite the challenges posed by unpredictable economic

cycles. Understanding regional characteristics is essential for identifying debt determinants and predicting economic reactions in such circumstances.

The results show that public debt is correlated with economic growth and the political regime in this region. An increase in the real GDP would be accompanied by a significant decrease in the level of debt, which seems to be the key to this relationship. The relationship between democracy and public debt has been a subject of much debate in recent times. Some argue that as democratic regimes mature, the debt ratio will decrease. However, the literature has challenged this notion, which suggests that developed and democratic countries do not necessarily have lower debt ratios.

In fact, there are many cross-country specifics involved in this issue. In the Balkans, corruption persists, and this may not decline even as democracy matures. Nevertheless, it is assumed that as democracy becomes more entrenched, corruption will be mitigated, leading to more efficient management of public finances. However, the regression coefficients explained above are at a low degree of significance and do not support the theoretical framework discussed so far. Should it be attributable to a possible insignificance in data accuracy or, at most, a derivate of methodological limitations? This might be a subject for further analysis.

Moreover, the findings suggest that tightening the current account deficits by increasing net exports and promoting domestic products would restrain further debt growth. Even though some countries in this region succeed with a surplus in the balance of payments, their debt level is exceedingly high.

The Kosovo-Croatia comparison presents a paradoxical scenario as Kosovo operates at a low public debt despite facing a significant deficit, while Croatia's case is the opposite. This contrast can be attributed to the impact of the initial debt ratio, which carries considerable weight in the GMM method and is positively correlated.

Lastly, the COVID-19 pandemic greatly shocked this region's debt level. The governments immediately ran through fiscal expansion to stimulate consumption. Covid-19 impact was unpredictable and impossible to prevent. This is why the policymakers must maintain "healthy" levels of public debt to hedge from the amazement of adverse events, where the budget deficits come to the rescue. At this stage, it is worth emphasizing that the central government would alleviate the ongoing pressure arising from debt overhang through a conservative approach.

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## APPENDIX A.

## Diagnostics Test for Stationarity - Unit Root Test

Variables	Test	ADF- Test Statistics	PP- Test Statistics
REAL_GDP_GROWTH	Level	0.0036**	0.0000***
	1 <sup>st</sup> difference	0.0000***	0.0000***
RIR	Level	0.5736	0.0116**
	1 <sup>st</sup> difference	0.0000***	0.0000***
UNEMPLOYMENT_RATE	Level	0.0405**	0.8470
	1 <sup>st</sup> difference	0.0000***	0.0000***
NPL_RATIO	Level	0.8333	0.6244
	1 <sup>st</sup> difference	0.0061***	0.0007***
FINANCIAL_DEPTH	Level	0.0155**	0.0585*
	1 <sup>st</sup> difference	0.0000***	0.0001***
FDI	Level	0.0000***	0.0000***
	1 <sup>st</sup> difference	0.0000***	0.0000***
CA_BALANCE	Level	0.0029**	0.0143**
	1 <sup>st</sup> difference	0.0000***	0.0000***
INFL	Level	0.0100**	0.0000***
	1 <sup>st</sup> difference	0.0000***	0.0000***
LIQUID_RESERVES_RATIO	Level	0.0000***	0.0000***
	1 <sup>st</sup> difference	0.0000***	0.0000***
PUBLIC_DEBT	Level	0.8648	0.1353
	1 <sup>st</sup> difference	0.0334**	0.0000***

Note: \*, \*\*, \*\*\* denote significance level at 10%, 5% and 1% respectively.

Source: own processing

## List of Data and Data Sources

Variable Code	Variable Name	Unit of Measurement	Source
ca_balance	Current account balance	Annual %	World Bank Database
p_debt	General government gross debt (% of GDP)	Annual %	International Monetary Fund
infl	Inflation, GDP deflator	Annual %	World Bank Database
f_depth	Monetary Sector credit to private sector (% of GDP)	Annual %	World Bank Database
npl	Bank non-performing loans to total gross loans (%)	Annual %	World Bank Database
pop	Annual population growth rate (%)	Annual %	World Bank Database
real_gdp_growth	GDP growth	Annual %	World Bank Database

*Source: own processing*

## Multicollinearity Check

	P_DEBT	NPL	LRR	INFL	F_DEPTH	CAB	RIR	UNEM
P_DEBT	1							
NPL	0.2	1						
LRR	-0.2	-0.2	1					
INFL	-0.3	-0.5	0.3	1				
F_DEPTH	-0.1	0.1	0.0	-0.2	1			
CAB	-0.1	0.1	0.1	-0.1	0.0	1		
RIR	-0.1	0.6	-0.2	-0.6	0.1	-0.2	1	
UNEM	-0.2	0.1	0.1	-0.2	0.1	-0.3	0.4	1

*Source: own processing*

<b>Zero Conditional Mean</b>	
	<b>RESID01</b>
Mean	2.31E-16
Median	0.045813
Maximum	6.745047
Minimum	-10.40711
Std. Dev.	2.453178
Skewness	-0.692873
Kurtosis	6.349419
<b>Observations</b>	<b>94</b>

*Source: own processing*

<b>Zero Conditional Mean - Correlation Matrix</b>	
	<b>RESID01</b>
PUBLIC_DEBT	-0.118648
NPL_RATIO	-9.06E-17
LIQUID_RESERVES_RATIO	-3.96E-17
INFL	-5.15E-17
FINANCIAL_DEPTH	1.66E-17
CA_BALANCE	-1.10E-16
RIR	1.34E-17
UNEMPLOYMENT_RATE	-7.72E-17
COVID_19	4.35E-17
RESID01	1

*Source: own processing*

### **Diagnostics Test - Heteroskedasticity**

<b>Dependent Variable: RESID01^2</b>				
<b>Method: Panel Least Squares</b>				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP_GROWTH	0.481443	0.471761	1.020524	0.3094
RIR1	-0.125905	0.652832	-0.19286	0.8474
UNEMPLOYMENT_RATE	0.159379	0.222865	0.715137	0.4758
CA_BALANCE	-0.361334	0.433883	-0.83279	0.4065
CA_BALANCE(-1)	0.228818	0.399809	0.572317	0.5681
CORRUPTION_INDEX1	0.239171	0.520241	0.459731	0.6465
DEMOCRACY_INDEX1	-0.7208	0.660549	-1.09121	0.2772
INFL	0.589223	0.584068	1.008827	0.315
COVID_19	4.781793	4.624598	1.033991	0.3031
C	2.01971	4.757988	0.424488	0.6719
<b>Prob(F-statistic)</b>	<b>0.553481</b>			

Source: own processing

**Diagnostics Test for Serial Correlation**

<b>Dependent Variable: RESID01</b>				
<b>Method: Least Squares</b>				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	0.040584	0.096957	0.418579	0.6763
RESID01(-2)	0.127677	0.099672	1.280974	0.2027

Source: own processing