Determinants of Economic Growth in the European Union Countries

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Abstract

This paper reassesses the long-debated relationship between the financial system development and economic growth. We use not only indicators for financial access, efficiency, stability and depth of the bank-oriented financial sector, but we also consider Eurozone membership, corruption perception and competitiveness of countries to examine the determinants of economic growth. We apply a panel data approach to 27 European countries over the 2004–2017 period. By splitting the time span, we examine whether the effect of financial system development, Eurozone membership, corruption perception and competitiveness on economic growth is affected by the occurrence of financial and debt crises. Our results indicate that loans to private sector do not always support economic growth. Our research also reveals that corruption perception has a negative impact on economic growth, and so does membership in Eurozone during a crisis.

INTRODUCTION

There is no doubt that the issue of the sources of economic growth is one of the most frequently researched areas in economics. While until the global financial crisis in 2008–2009 reputable studies argued that the financial system development increases the country's performance, improves resources allocation, supports technology development and financial stability, after the global financial crisis the situation changed, and the financial systems became the central subject of criticism when explaining the causes of economic recession. However, economists have still not come to the battle of wills about an impact of financial systems on economic growth. Over the years, we find in economic literature the views

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of authors, who in their analyses lean to one side or the other. To authors who claim a positive impact of finance on economic development belong Dollar (1992), Ben-David (1993), Wacziarg and Welch (2008), Lucas (2009), Perera and Paudel (2009), Madsen and Ang (2016). On the contrary, to the authors who claim a negative impact of finance on economic growth belong Demirguc-Kunt and Detragiache (1998), Fisher and Chenard (1997), Pinar and Damar (2006), Ayadi et al. (2013), Karagiannis and Kvedaras (2016), and Barradas (2018).

The aim of this study is to analyse the impact of selected financial soundness indicators of the bank-oriented financial systems on economic growth in the European Union countries. To enrich the existing strand of literature, we investigate not only the determinants typical for access, efficiency, stability and depth of the financial system, but also non-financial determinants as the perception of corruption, competitiveness in the economic environment, and the impact of the Eurozone membership. As time perspective, we analyse period from 2004 to 2017, as it enables us to examine an impact of selected determinants on the economic growth in the period before and after the financial crisis.

The analysis confirmed positive impact of credit on economic growth before the financial crises and a negative impact since crisis. This finding is in line with Ayadi, Emrah, Sami and Willem (2013), and Barradas (2018). It is evident that loans injected into economy during and after crises covered only operational needs of companies and were used for household consumption but did not support the economic growth (with the exception of Poland).

Our research also reveals that the membership in Eurozone during crisis disables the use of autonomous monetary and exchange tools and therefore has a negative impact on economic growth. As expected, the corruption perception shows a negative impact on economic growth. It is in line with Wu and Wei (2002).

The paper is structured as follows. The first part contains a brief literature overview, the second part provides description of data and model specifications, the third part reports main research findings that are discussed and in the final one concludes.

1 LITERATURE REVIEW

In their landmark study, Čihák, Demirguc-Kunt, Feyen and Levine (2013) invented several measures to benchmark financial systems: (a) the size of financial institutions and markets (financial depth), (b) the degree to which individuals can and do use financial institutions and markets (access), (c) the efficiency of financial institutions and markets in providing financial services (efficiency), and (d) the stability of financial institutions and markets (stability). These four characteristics were measured both for financial institutions and financial markets (equity and bond markets), thus covered bank-oriented and market-oriented financial systems. Their seminal paper enabled using these measures to characterize and compare financial systems across countries and over time and to assess the relationship between these measures of the financial system and key financial sector policies.

Tadesse (2002) examined whether economic growth was more favourably affected by bank-oriented financial systems or market-oriented financial systems. He found out that bank-oriented financial systems were much better in countries with underdeveloped financial systems and market-oriented systems outperformed bank-oriented systems in countries with developed financial systems. This finding was confirmed by Demirguc-Kunt, Feyen and Levine (2013), and Cambacorta, Yang and Tsatsaronis (2014). Arcand, Berkes and Panizza (2015) found out that the financial depth ceased to have positive impact on the economic growth when private sector credit exceeded 100% of gross domestic product (GDP). Similar research was conducted by Beck, Georgiadis and Straub (2014), who came to a similar result; their threshold was 109% of the share of private credit to GDP. Caporale et al. (2009) examined the interconnection between financial development and economic growth in the new EU member states (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) by Granger causality and revealed that the causality came from financial development

to economic growth. Georgantopolus et al. (2015) focused on examining the relationship between financial systems and economic growth. They evaluated this relationship for the 28 EU member states divided into two groups; countries that belong to the Eurozone (17 countries) and those, that did not adopt the euro (11 countries). They argued that the adoption of euro required closer and more centralized political, economic, fiscal and financial cooperation between the Eurozone members. The group with countries of the Eurozone showed a significant contribution of the financial sector to the economic growth. On the contrary, the group of countries outside the Eurozone showed a significant negative impact of the banking sector on the economic growth. Armin, Ibrahim and Azman-Saini (2012) examined the relationship between the financial development and economic growth in 15 economically developed countries before and after the euro adoption. The results of panel regression showed that the financial development is important in supporting economic growth in both periods examined. They found out that the impact of the banking sector on economic growth was greater after the euro adoption, while the impact of developments on the market diminished over the examined period. The results of Stolbová, Battiston, Napoletano and Roventini (2017) showed an overall trend in increasing of financing in the Eurozone, as well as in individual countries of the EU, during the examined period. However, the pace of increasing of financing is different. The result of network analysis was the finding that a large part of the assets owned by financial institutions are in fact securities issued by other financial institutions.

As stated in the introduction of this study, within our analysis we focus our attention solely on the bank-oriented financial systems and their interaction with economic growth in the EU countries. Our intention is to analyse the determinants of economic growth according to the definition specified by Čihák et al. (2013). We, therefore, examine the impact of the bank-oriented financial system on economic growth in terms of four main characteristics; in terms of access, efficiency, stability and depth of the financial system. Moreover, our analysis also includes determinants which reflect the membership in the Eurozone, perception of corruption and competitiveness in economics, but also variables, which reflect world financial crisis in years 2008–09 and debt crisis in years 2010–2012. Thus we would like to broader the studies of Čihák (2013), Nyasha and Odhiambo (2017), Chu (2020) and other, financial determinants by other important areas, such as corruption perception, level of competitiveness of countries and the Eurozone membership.

2 DATA AND MODEL SPECIFICATION
2.1 Data specification
In this paper we analyse unbalanced panel data of the 27 EU countries in the period from 2004 to 2017. Researched economic growth is expressed by the gross domestic product per capita. Based on the study of Čihák et al. (2013) in order to measure the impact of bank-oriented financial system on the economic growth, we use (a) financial resources provided to the private sector over GDP as a measure of financial depth, (b) number of commercial bank branches to measure access of financial services, (e) return on equity as a measure of efficiency, and (d) Z-score to reflect stability of a financial system.

In our study we also included corruption perception index (CPI) and global competitiveness index (GCI), which significantly resonate at present times. The corruption perception index reflects the information about perceiving the level of corruption in 180 countries of the world, including all of the EU countries and it is published by Transparency International. The global competitiveness index has been published since 2004 by the World Economic Forum. The index reflects the competitiveness of countries in the world and is composed of more than 100 indicators, which assess different pillars of competitiveness. In addition, the study includes three dummy variables: Eurozone membership, global financial crisis (GFC) and debt crisis (DC). Period of global financial crisis and debt crisis is adopted from OECD Economic Outlook (2021) and it does not consider possible individual differences among

analysed countries. Table 1 shows the description, sources of the variables used as well as their expected impact on the economic growth.

Table 1 Description of variables

Variable	Description	Unit of measure	Source	Expected impact on economic growth
GDP per capita – dependent variable	Gross domestic product divided by midyear population	Year over year percentage change	(World Bank)	
Access	Number of commercial bank branches per 100 000 adults	Year over year percentage change	(World Bank)	+
Efficiency	Bank ROE – commercial banks' pre-tax income to yearly averaged equity	Year over year percentage change	(World Bank)	+
Stability	Bank Z-score – it captures the probability of default of a country's commercial banking system	Year over year percentage change	(World Bank)	+
Depth	Domestic credit to private sector – financial resources provided to the private sector	Year over year percentage change	(World Bank)	-
CPI	Corruption perception index	Year over year percentage change	(Transparency International)	+
GCI	Global competitiveness index	Year over year percentage change	(World Bank)	+
Eurozone	Countries that are members of the Eurozone	Dummy variable (if 1 selected country is a member of Eurozone; 0 otherwise)	-	+
GFC	Global financial crisis in 2008 and 2009	Dummy (1 indicates the global financial crisis in 2008 and 2009; 0 otherwise)	-	-
Debt crisis	Debt crisis from 2010 to 2012	Dummy (1 means the year when the debt crisis has begun in European Union)	-	-

Source: Authors

The economic growth is expressed as gross domestic product per capita in annual percentage change. Its development in individual countries of the EU, together with the median, can be seen in Figure 1. The figure clearly visualizes whether the annual change in economic growth was above or below the median value of the analysed countries. It should be noted that median is the same line in all partial charts in Figure 1. As shown in Figure 1, individual countries of the EU recorded year-over-year growth in the period from 2004 to 2008. In 2008, as a result of the economic crisis, there was an economic downturn in almost all the EU countries. The exception was Poland, whose growth rate is above the median value throughout all analysed period. A significant negative impact on the economy confirm the studies of Checherita-Westphal and Rother (2012), Gómez-Puig and Sosvilla-Rivero (2015), and Pegkas et al. (2020). In 2010, the countries of the EU were hit by the debt crisis, after which GDP fell again, however, to a lesser extent than was in the case of the economic crisis. Cyprus and Portugal were hit hard by both crises; GDP fell even deeper during the debt crisis than during the economic crisis. Most of the EU countries were able to stabilize quickly and initiate the GDP growth, except for Greece. The Greek economy was in recession from 2008 to 2016. Based on the graphical results, we decided in this study to focus more on examining the impact of determinants before and after the economic crisis.

Figure 1 Development of GDP per capita in the countries of the European Union

growth of GDP per capita
median od growth of GDP per capita
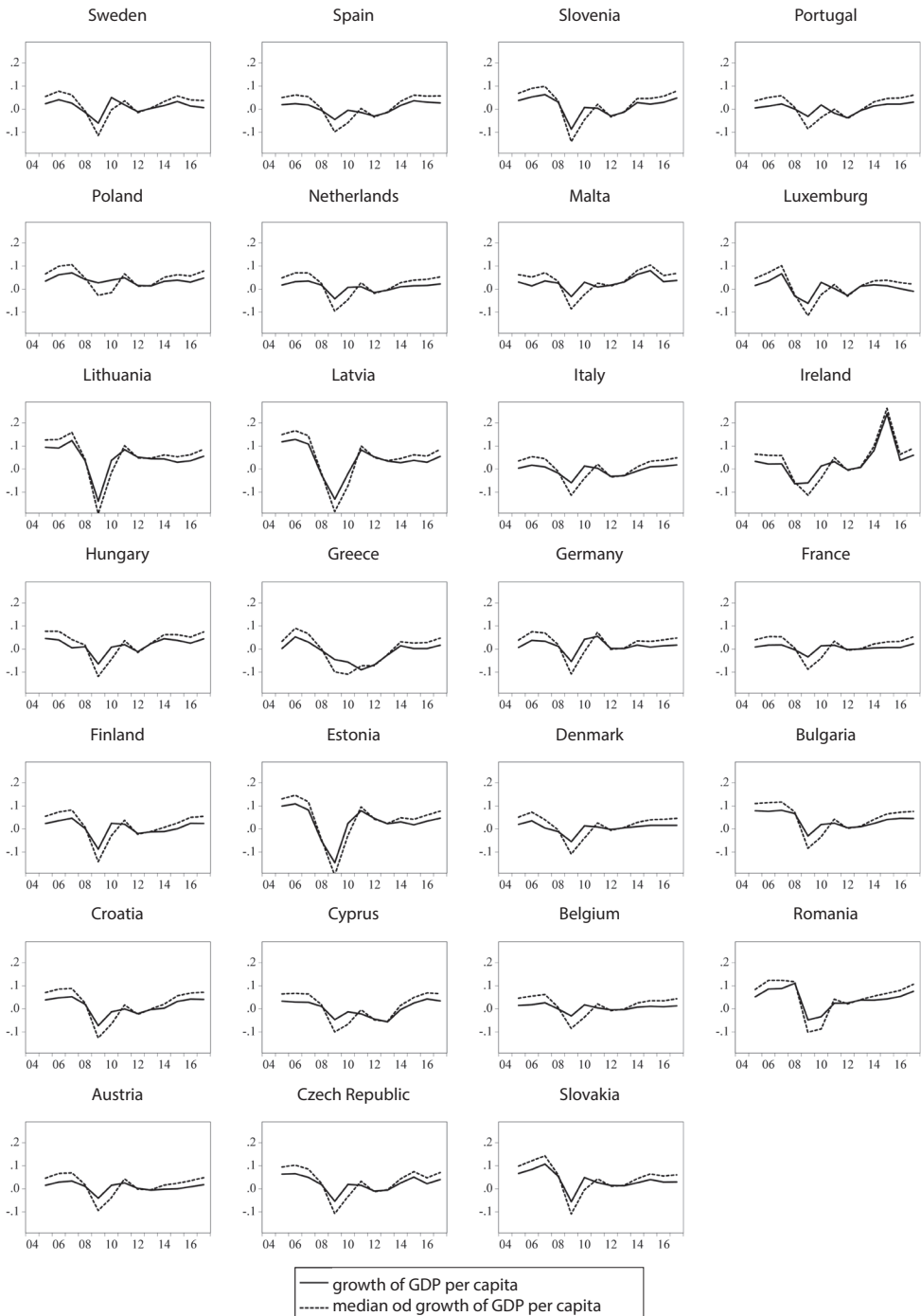
Table 2 presents descriptive statistics for the whole data set of the 27 EU countries in the years 2004–2017. The number of observations varies depending on the variable, as the data set is unbalanced. In terms of indicators, we can point out, for example, the negative value of the median of efficiency variable. This indicates that approximately 50% of the EU countries had a negative ROE during the period examined. The values of the access to finance indicator, which are represented by the number of branches per 100 000 inhabitants, indicates a decrease in the number of branches, which coincides with the ever-expanding trend of branchless banking.

Table 2 Descriptive statistics

	Mean	Median	Standard deviation	Minimum	Maximum
GDP per capita	1.768	1.833	3.991	−14.56	23.94
Access	−2.510	−2.278	10.44	−73.65	108.6
Efficiency	18.61	−10.30	700.9	−1684	11944
Stability	135.4	2.103	1163	−99.56	14587
Depth	1.698	1.268	9.387	−33.93	42.05
CPI	0.701	0.000	5.311	−19.15	24.24
GCI	0.224	0.000	3.452	−16.99	25.00
Eurozone	0.587	1.000	0.493	0.000	1.000
GFC	0.143	0.000	0.350	0.000	1.000
Debt crisis	0.214	0.000	0.411	0.000	1.000

Notes: All variables excluding dummy variables are expressed as year over year percentage change; Access – bank branches per 100 000 adults; Efficiency – bank return on equity (ROE in %); Stability – bank Z-score; Depth – domestic credit to private sector (% of GDP); CPI – Corruption perception index; GCI – Global competitiveness index; Eurozone – dummy variable (if 1 – country is a member of Eurozone, 0 – otherwise), GFC – dummy variable (if 1 – global financial crisis in 2008 and 2009, 0 – otherwise); DC – Debt crisis – dummy variable (if 1 – Debt crisis from 2010 to 2012, 0 – otherwise).
Source: Authors

One of the important assumptions when performing this analysis and constructing models, to the extent that we present in this study, is the assumption of uncorrelated independent variables. In Table 3 we present the results of correlation analysis. The results show only a small degree of dependence between the explanatory variables.

Table 3 Correlation matrix

	Access	Efficiency	Stability	Depth	CPI	GCI	Eurozone	GFC	Debt crisis
Access	1								
Efficiency	0.0200	1							
Stability	−0.0097	−0.0189	1						
Depth	0.2501	0.0241	−0.0435	1					
CPI	0.1168	−0.1046	−0.0092	0.0804	1				
GCI	0.0635	0.0230	−0.0144	−0.1574	0.0999	1			
Eurozone	−0.0777	−0.0405	−0.0795	−0.2146	−0.1637	0.0412	1		
GFC	0.0703	0.0330	0.1079	−0.1637	−0.1400	−0.0817	−0.0123	1	
DC	−0.0623	0.0056	0.0745	−0.2180	0.0353	0.0007	0.0302	−0.2132	1

Source: Authors

We subjected the continuous variables to stationarity tests and used unit root tests LLC, IPS, ADF and PP tests. Results indicate that the selected variables are stationary and do not contain a unit root. In case of the depth variable, we recorded the presence of unit root at the significance level of 0.05 by ADF test. Since LLC, IPS and PP tests at the significance level of 0.05 do not statistically confirm the presence of a unit root, we can state that these data are stationary.

Table 4 Unit root test for each continuous variable

	LLC	IPS	ADF	PP	Result
GDP per capita	−10.073 (0.000)	−5.760 (0.000)	125.81 (0.000)	119.492 (0.000)	Stable
Access	−35.279 (0.000)	−6.982 (0.000)	80.061 (0.008)	119.266 (0.000)	Stable
Efficiency	−4.257 (0.000)	−5.135 (0.000)	115.040 (0.000)	240.795 (0.000)	Stable
Stability	−7.155 (0.000)	−5.740 (0.000)	126.443 (0.000)	265.684 (0.000)	Stable
Depth	−6.399 (0.000)	−1.773 (0.038)	69.492 (0.076)	120.093 (0.000)	Stable
CPI	−5.224 (0.000)	−5.391 (0.000)	120.050 (0.000)	208.248 (0.000)	Stable
GCI	−10.906 (0.000)	−8.560 (0.000)	175.035 (0.000)	334.606 (0.000)	Stable

Source: Authors

2.2 Model specification

A substantial part of empirical research in this study focuses on the analysis of panel data, through GLS.

The model used in the research can be written in the following form:

$$EG_{it} = \alpha_i + \beta_j \, FS'_{it} + \gamma_k \, IN'_{it} + \delta_l \, DV'_{it} + \mu_{it} \, , \tag{1}$$

where:

$$FS'_{it} = (A_{it}, E_{it}, S_{it}, D_{it})', $$
$$IN'_{it} = (CPI_{it}, GCI_{it})', \tag{2}$$
$$DV'_{it} = (EA_{it}, GFC_t, DC_t)'. $$

The symbol i represents a specific country, t stands for a time, j, k, l correspond to specific type of financial structure variable, index variable and dummy variable. EG_{it} is the explained variable economic growth, FS'_{it} represents vector of financial structure indicators, IN'_{it} is the vector of index variables, DV'_{it} is the vector of dummy variables, A_{it} is the variable reflecting the access to the financial system, reflects the efficiency of the financial system, E_{it} represents the financial system stability, D_{it} is the financial system depth, CPI_{it} is the coruuption perception index, GCI_{it} is the global competitiveness index, EA_{it} reflects the membership and entry into the Eurozone, GFC_t is the dummy variable reflecting the financial crisis, DC_t represents the dummy variable of the debt crisis and μ_{it} represents the error term.

Within our analysis we examine five models in three time periods. The first time span is the period from 2004 to 2017. The second time span is the sub-period from 2004 to 2009 and the third time span is the sub-period from 2010 to 2017. In these time periods we gradually examine five different models, which are composed of individual vectors of the hypothetical model (1).

A similar methodology was also addressed by Armin, Ibrahim and Azman-Saini (2012), Přívara and Trnovský (2021), Pegkas et al. (2020), Shittu et al. (2020), Agapova and Vishwasrao (2020), Mazurek (2017), and Pinar and Damar (2006). We contribute to existing literature by including the indicators that are nowadays topical.

3 RESULTS AND DISCUSSION

Table 5 provide results for the panel regression for the whole period from 2004 to 2017, while Table 6 contains results for the period span from 2004 to 2009 and the Table 7 for the period span from 2010 to 2017, respectively. Based on the Hausman test, we use the random effect of GLS, as Zhang, Wang and Ren (2021), Naghshpour (2019), and Prochniak (2011).

The regression results over the 2004–2017 period contain 5 models. Model 1 takes into consideration an impact of main financial indicators to assess access, efficiency, stability and depth of the bank-oriented financial systems on economic growth. Model 2 analyses not only an impact of financial indicators

Table 5 Regression results over the 2004–2017 period

Explanatory variable	Explained variable				
	GDP per capita				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Random effect	Random effect	Random effect	Fixed effect	Random effect
Access	0.049** (0.0208)	0.038* (0.0207)	0.053*** (0.0164)	0.049*** (0.0176)	0.046*** (0.0171)
Efficiency	0.0006** (0.0003)	0.0007** (0.0003)	0.0007*** (0.0002)	0.0008*** (0.0002)	0.0008*** (0.0002)
Stability	−0.0003 (0.0002)	−0.0003 (0.0002)	0.00005 (0.0014)	0.0001 (0.00015)	0.00002 (0.00014)
Depth	−0.024 (0.0241)	−0.016 (0.0243)	−0.013 (0.0208)	0.002 (0.0213)	−0.008 (0.0211)
CPI		0.135*** (0.0409)		0.0584* (0.0348)	0.062* (0.0341)
GCI		0.097 (0.0641)		0.0445 (0.0537)	0.071 (0.0528)
Eurozone			−1.737*** (0.519)		−1.675*** (0.483)
GFC			−5.891*** (0.482)	−5.750*** (0.4944)	−5.706*** (0.4902)
Debt crisis			−2.148*** (0.414)	−2.118*** (0.494)	−2.126*** (0.416)
intercept	1.853*** (0.3147)	1.714*** (0.2673)	4.304*** (0.468)	3.108*** (0.2293)	4.160*** (0.4311)
Rho	0.3193	0.2817	0.240	0.2418	0.2345
Hausman test (p-value)	2.306 (0.680)	10.969 (0.089)	1.414 (0.965)	14.349 (0.0453)	9.3677 (0.3122)
AIC	1 863.03	1 850.60	1 738.22	1 727.97	1 734.86
SIC	1 882.09	1 877.28	1 768.71	1 857.53	1 772.97
Log-likelihood	−926.52	−918.30	−861.11	−829.99	−857.43

Notes: All numerical variables (except dummy variables) – year over year percentage change; Access – bank branches per 100 000 adults; Efficiency – bank return on equity (ROE in %); Stability – bank Z-score; Depth – domestic private credit to GDP (% of GDP); CPI – corruption perception index; GCI – global competitiveness index; Eurozone – dummy variable (if 1 – country is a member of Eurozone, it reflects also the year of joining to Eurozone, 0 – otherwise), GFC – dummy variable (if 1 – global financial crisis in 2008 and 2009, 0 – otherwise); Debt crisis – dummy variable (if 1 – debt crisis from 2010 to 2012, 0 – otherwise); p-values are in parentheses; *, **, *** indicate significant at 10, 5 and 1% level, respectively.
Source: Own estimates

but also an effect of the corruption perception (CPI) and competitiveness in economy (GCI). Model 3 abstracts from the control variables CPI and GCI and examines an impact of the Eurozone membership and it also takes into account an impact of economic and debt crisis. Model 5 examines the impact of all explanatory, control and also dummy variables. Model 4 differs from Model 5 by abstracting the impact of the Eurozone membership.

Except for Model 1, indicators access and efficiency demonstrated a significant positive impact on economic growth within the whole period. Surprisingly, indicators stability and depth are statistically insignificant at all significance levels in all regression models. With the extension of model by the corruption perception index and the global competitiveness index the levels of significance of financial structure indicators did not change. The model supported the statement that diminishing corruption has a positive impact on economic growth. We can also say that the financial structure in terms of efficiency and access has a significant impact on the economic growth even when taking into account the economic and debt crisis. Membership in the Eurozone had a significantly negative impact on all levels of significance

Table 6 Regression results over the 2004–2009 period

Explanatory variable	Explained variable				
	GDP per capita				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Random effect	Random effect	Random effect	Fixed effect	Random effect
Access	0.073* (0.0387)	0.059 (0.0381)	0.038 (0.287)	0.029 (0.0288)	0.029 (0.0286)
Efficiency	0.0003 (0.0002)	0.0005 (0.0003)	0.0006*** (0.0002)	0.0007*** (0.0002)	0.0006*** (0.0002)
Stability	0.00001 (0.0003)	0.00002 (0.0003)	0.0005* (0.0003)	0.0004* (0.0002)	0.0004* (0.0003)
Depth	0.213*** (0.0493)	0.178*** (0.0503)	0.100** (0.0397)	0.110*** (0.0385)	0.091** (0.0399)
CPI		0.237*** (0.0784)		0.145** (0.060)	0.126** (0.0604)
GCI		0.079 (0.0934)		0.071 (0.0702)	0.082 (0.0701)
Eurozone			−1.298* (0.671)		−1.098 (0.6729)
GFC			−6.733*** (0.666)	−6.470*** (0.666)	−6.480*** (0.662)
Debt crisis	-	-	-	-	-
intercept	−0.437 (0.5978)	−0.206 (0.5831)	3.897*** (0.7260)	2.983*** (0.5478)	3.745*** (0.7171)
Rho	0.310	0.254	−0.057	−0.048	−0.047
Hausman test (p-value)	2.849 (0.583)	2.801 (0.833)	2.284 (0.892)	4.249 (0.751)	2.710 (0.951)
AIC	765.92	758.99	688.92	686.82	685.99
SIC	780.18	778.95	708.88	709.64	711.66
Log-likelihood	−377.96	−372.49	−337.46	−335.41	−333.99

Notes: All numerical variables (except dummy variables) – year over year percentage change; Access – bank branches per 100 000 adults; Efficiency – bank return on equity (ROE in %); Stability – bank Z-score; Depth – domestic private credit to GDP (% of GDP); CPI – corruption perception index; GCI – global competitiveness index; Eurozone – dummy variable (if 1 – country is a member of Eurozone, 0 – otherwise), GFC – dummy variable (if 1 – global financial crisis in 2008 and 2009, 0 – otherwise); Debt crisis – dummy variable (if 1 – debt crisis from 2010 to 2012, 0 – otherwise); p-values are in parentheses; *, **, *** indicate significant at 10, 5 and 1% level, respectively.
Source: Own estimates

in the models for the whole period examined. As expected, economic and debt crisis had a significantly negative impact on the economic growth.

In contrast to the whole analysed period (Table 5), the indicator depth demonstrated a significant positive impact on economic growth in the pre-crisis period. It is evident, that the financial depth indicator had a strong positive impact in the pre-crisis period, but after the financial crisis its impact on the economic growth changes to negative one (Table 7). Adding the dummy variable, which includes the economic crisis, the impact of indicators has changed only slightly. The financial structure stability indicator in the extended models 3, 4, and 5 came out at the level $\alpha = 0.1$ as statistically significant with a positive impact on economic growth, which met our assumptions.

Table 7 Regression results over the 2010–2017 period

Explanatory variable	Explained variable				
	GDP per capita				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Random effect	Random effect	Random effect	Fixed effect	Random effect
Access	0.0168 (0.0168)	0.0198 (0.0169)	0.0223 (0.0164)	0.0247 (0.0165)	0.025 (0.0166)
Efficiency	−0.0011** (0.0005)	−0.0011** (0.0005)	−0.001** (0.0005)	−0.001** (0.0005)	−0.001** (0.00049)
Stability	−0.0004*** (0.0001)	−0.0004*** (0.0001)	−0.0003** (0.0001)	−0.0003** (0.00013)	−0.0003** (0.00013)
Depth	−0.2884*** (0.0295)	−0.2909*** (0.0298)	−0.2781*** (0.0292)	−0.2841*** (0.0293)	−0.2818*** (0.0296)
CPI		−0.0474 (0.0316)		−0.0438 (0.0307)	−0.0442 (0.0308)
GCI		0.1145* (0.0689)		0.0894 (0.0673)	0.0884 (0.0675)
Eurozone			−0.2731 (0.5517)		−0.2928 (0.5434)
GFC	-	-	-	-	-
Debt crisis			−1.0753*** (0.3018)	−0.9992*** (0.2992)	−1.0225*** (0.3032)
intercept	1.1554*** (0.3100)	1.1306*** (0.3038)	1.7927*** (0.5247)	1.5538*** (0.3335)	1.7697*** (0.5200)
Rho	0.1228	0.1060	0.0817	0.0666	0.0682
Hausman test (p-value)	1.4495 (0.8356)	5.292 (0.5068)	5.0211 (0.5411)	5.245 (0.6301)	8.926 (0.3486)
AIC	954.701	954.660	946.787	948.501	947.423
SIC	971.340	977.955	970.083	975.13	977.494
Log-likelihood	−472.350	−470.330	−466.394	−466.252	−464.771

Notes: All numerical variables (except dummy variables) – year over year percentage change; Access – bank branches per 100 000 adults; Efficiency – bank return on equity (ROE in %); Stability – bank Z-score; Depth – domestic private credit to GDP (% of GDP); CPI – corruption perception index; GCI – global competitiveness index; Eurozone – dummy variable (if 1 – country is a member of Eurozone, 0 – otherwise), GFC – dummy variable (if 1 – global financial crisis in 2008 and 2009, 0 – otherwise); Debt Crisis – dummy variable (if 1 – debt crisis from 2010 to 2012, 0 – otherwise); p-values are in parentheses; *, **, *** indicate significant at 10, 5 and 1% level, respectively.
Source: Own estimates

When examining the impact of determinants on economic growth after the economic crisis, several significant changes have occurred. The indicators of efficiency, stability and depth came out with negative impact on economic growth in the given period. The negative impact of the domestic credit to

private sector was expected based on the studies dealing with finance-growth nexus Ayadi, Emrah, Sami and Willem (2013), Barradas (2018), Arcand, Berkes and Panizza (2015). They reveal similar outcomes and stress importance of regulation in finance. We assume that from short term perspective credits influence the economic growth positively and their expansion supports the economy, however, from long term perspective, and as the economic cycle accelerates, they can become a burden to economic growth, which is also supported by our results. It should be noticed that our indicator of depth included traditional credits to private sector over gross domestic product provided by regulated banking sector. To support economic growth after a crises more sophisticated forms such as crowdfunding might be used. A surprising result is the negative impact of the remaining two indicators of efficiency and stability, for which, on the contrary, we expected a positive impact. In case of the efficiency indicator, declines in interest margins, which reached negative values in the post-crisis period, have a strong adverse impact on the economic growth. Results of our research reveal that economic growth might be driven by non-banking institutions that are not regulated by the central banks. Our results indicate that the Eurozone membership does not contribute to the economic growth during the crises times. This result is not unlikely since individual countries joined in monetary union might miss autonomous monetary and exchange policies to fix their specific problems. The study results suggest a major role for the governments of the Eurozone member countries in designing appropriate macroeconomic policies. They highlight importance of the balanced budget rules recently adopted in the Eurozone. The fiscal rule framework needs to be more effective in reducing high levels of indebtedness in some member countries. Reducing the public debt across euro area countries would allow to set up a common macroeconomic stabilisation function and this, in turn, would help to overcome deep economic crises.

CONCLUSION

This paper contributes to the existing literature about relationship between financial system development and economic growth in European Union countries with new results based on a larger data set and the longer time span 2004–2017. Among determinants of economic growth in the European Union countries it incorporates not only indicators for financial access, efficiency, stability, and depth of the bank-oriented financial sector but it also includes additional topical control variables: Eurozone membership, corruption perception and competitiveness of countries. Splitting the time span allows us to examine whether the chosen determinants of economic growth are affected by the occurrence of financial and debt crises. We apply a panel data GLS approach and estimate results by five models: Model 1 takes into consideration an impact of main financial indicators to assess access, efficiency, stability, and depth of the bank-oriented financial systems on economic growth. Model 2 analyses not only an impact of financial indicators but also an effect of the corruption perception (CPI) and competitiveness in economy (GCI). Model 3 abstracts from the control variables CPI and GCI and examines an impact of the Eurozone membership and economic and debt crisis. Model 5 examines the impact of all variables on economic growth. Model 4 differs from Model 5 by abstracting the impact of the Eurozone membership.

As stated in the paper, over the period 2004–2017 indicators access and efficiency demonstrated a significant positive impact on economic growth while indicators stability and depth are statistically insignificant at all significance levels in all regression models. In contrast to the whole analysed period, the indicator depth revealed a significant positive impact on economic growth in the pre-crisis period and a strong negative impact after financial crises and during debt crises.

Our results also indicate that the Eurozone membership does not contribute to the economic growth during the crises times. This result is not unlikely since individual countries joined in monetary union might miss autonomous monetary and exchange policies to fix their specific problems. The study results suggest a major role for the governments of the Eurozone member countries in designing appropriate

macroeconomic policies. They highlight importance of the balanced budget rules recently adopted in the Eurozone. The fiscal rule framework needs to be more effective in reducing high levels of indebtedness in some member countries. Reducing the public debt across euro area countries would allow to set up a common macroeconomic stabilisation function and this, in turn, would help to overcome deep economic crises. The framework should benefit from the long-lasting experience of the fiscal rule frameworks adopted in Switzerland or USA though there are important differences in all three areas. The reflection of the fiscal compact in national rules should ultimately help to increase the resilience of the Eurozone.

Our future research will be in line with the European Green Deal adopted by the European Commission as a set of proposals to make the EU's climate, energy, transport, and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. We plan to extend the financial sector determinants by a wider range of control variables, use static and dynamic panel data and employ advanced estimation techniques.

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