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Verification of “Too Much Finance” Hypothesis in Central and Eastern European Countries – Empirical Research

Abstract: This paper analyses the relationship between the domestic credit to GDP ratio and economic growth in a group of 11 countries in Central and Eastern Europe. The parameters of the econometric model used, were estimated using a pooled regression method and the Blundell-Bond systemic estimator. The results of our empirical investigation show that the entire group can be divided into 3 homogeneous sub-groups with different values of the optimal level of domestic credit to GDP ratio. Estimation of the parameters with the use of a panel model show that Latvia, Lithuania, Estonia and Slovakia would probably have reached a higher level of economic growth if the analysed coefficient had been at a level of 0.48. In the case of the sub-group encompassing Poland, Czech Republic and Hungary, the optimal value of the analysed coefficient turned out to be 0.6. In the case of the Bulgaria, Croatia and Romania sub-group, the development of the financial system, which is represented in this article by the ratio of domestic credit to GDP, does not seem to have any impact on the rate of growth of real GDP.

Keywords: financial development, GDP growth, panel data model

JEL: F20, F30, F43, G15, G28, C33

1. Introduction

During the last four decades (especially during the recent financial crisis), very fast changes in economic processes have been observed. This is due to a revolution in the financial industry and how it searches for more efficient financial systems. The governments of developed and developing countries have tried to find the optimal model of development for their financial systems, which would support the development of their national economies.

The role of the financial sector's own development in national economic growth has become a major topic in empirical research. Earlier studies concluded that there is a positive relationship between financial development and economic growth. Recent research further differentiates between various time periods, different levels of development (industrialized countries, emerging and developing), and financial sectors. However, inquiries into the finance-growth nexus of emerging economies in Central and Eastern European (CEE) countries are scarce. As such, this paper contributes to the economic literature in two ways. Firstly, we consider the relationship between the development of financial sectors and economic growth in the Central and Eastern European countries that have joined the European Union, and estimate the parameters of the growth regression, depending on the domestic credit to GDP ratio for these countries. We test the stability of this relationship and analyse the differences between the countries. In many other studies devoted to this issue, the homogeneity of these relations is assumed, without testing for poolability. Secondly, we try to identify the optimal level of the domestic credit to GDP ratio for the countries under consideration. To the best of our knowledge, such attempts have previously been made mainly for developed countries.

We consider the econometric model with the level and square variable and verify the 'too much finance' hypothesis. This means we can find the point after which the growing assets of a country's financial sector start having a negative influence on that country's economic growth. When we test the stability of this relationship between countries, we also make this estimation for the sub-groups of countries with stable relations. Next, we calculate the optimal value of the domestic credit to GDP ratio for each group. Overall, the paper has the following structure: in the first section we introduce our idea and some of the theoretical aspects of the problem. In the second section we present a review of the literature. In the third section, the history of the development of the financial system in Central and Eastern Europe is presented. The fourth section consists of our estimation of the parameters of growth regression, and verification of the 'too much finance' hypothesis. The fifth section contains the conclusion.

2. Finance-growth nexus in the Central and Eastern European countries. Literature review

In the market economy, a financial system is defined as the mechanism of co-creation and flow of purchasing power between economic operators. It consists of instruments, markets, and financial institutions, as well as the principles on which they operate. The financing of economic growth may be divided into direct (through capital markets) and indirect (through financial intermediaries). Channels through which financial development affects economic growth include improvement in the productivity of production factors and the accumulation of capital. Due to the existence of the financial system, the information and the transaction costs are lower and resources are better allocated in conditions of uncertainty (Levine, Zervos, 1998). Effective financial markets and an efficient banking system have a positive impact on the wealth of society because they enable the flow of financial means and their accessibility. As a result, production rates, consumption levels and the effectiveness of an economy rise.

Generally speaking, there is agreement in the literature that financial development affects economic growth (see, e.g., Rioja, Valev, 2004; Beck, Levine, 2004; Próchniak et al., 2016; Maciejczyk-Bujnowicz, 2016). However the direction of the linkage between finance and growth seems to be questionable. According to the 'supply-leading' view, the supply of the financial services plays a very important role. The presence of financial middlemen has a positive impact on the effectiveness of capital accumulation and leads to an increase of the savings rate. On the other hand, according to the 'demand-following' view, financial institutions are forced to develop more and more advanced financial services when enterprises are encouraged by the market to create additional demand. Bi-directional causality between financial development and economic growth was confirmed by, among others, Shan, Morris, Sun (2001).

Though the results of empirical investigations confirm that the relationship between financial development and economic growth is positive in both developed and developing economies, this problem has not been extensively explored in the case of transition countries. The hypothesis of a relationship between financial development and economic growth for the countries of Central and Eastern Europe was examined by, among others, Dawson (2003), who used data covering the period 1994–1999. Gillman and Kejak (2004) repeated Dawson's research using an extended sample up to 2002. According to the results of these two papers, there was no significant and positive relationship between financial development and economic growth. According to the results of the investigation of Akimov, Wijeweer and Dollery (2009), a positive relation between financial development and economic growth was identified; however, the authors argue that weak linkages might have resulted from the fact that the financial system had been relatively weakly developed in the transition countries.

The relationship between the financial development and growth for the analysed group of countries was investigated among others by Bonin and Watchel (2003). According to the authors' conclusions, in the last decade of the twentieth century, well-functioning financial intermediaries had a significant impact on growth. Atkins (2006) noted that in the countries of the Central and Eastern Europe, banks played a major role in promoting growth. According to the authors' results, commercial banks dominated in the provision of financial services to microenterprises. Therefore, development of the banking sector is necessary for financing investments. However, their effectiveness was lower and the percentage of bad loans in their portfolios was larger compared to commercial banks in the developed countries where, in contrast to transition economies, the financing of enterprises depends more strongly on the development of the capital market. Summarizing the considerations about the directions and dynamics of development of the financial systems in transition economies, one may conclude that these countries for their further development need a diversified system of financial services. In particular, the percentage of financing with capital coming from the stock exchange should be larger (Bonin, Watchel, 2003). Moreover, the environment for financial intermediaries should be improved and supervision should be strengthened. However, generalizations for the whole set of countries of Central and Eastern Europe are difficult because of the large differences between their economies. The relationship between regulations in the banking sector and economic growth for the Polish economy was analysed by, among others, Marcinkowska et. al. (2014). The results obtained by these authors indicate that increasing capital and liquidity requirements may have a slightly negative effect on economic growth, due to the limitation of the credit supply.

Most of research devoted to interlinkages between financial development and economic growth, conducted in previous century, indicated that the relationship should be positive. After the financial systems in the industrialized countries increased substantially, economists started to wonder whether too large a financial system could actually hamper economic growth. Fung (2009) argued that in poor countries financial development helps in catching-up to the productivity frontier, while the positive effects from financial depth are limited for countries close to the frontier. The problems of the nonlinear relationship between the development of the financial sector and economic growth grew after the outbreak of the global financial and economic crisis (e.g. Arcand, Berkes, Panizza, 2012; Cecchetti, Kharroubi, 2012; 2015; Beck, Degryse, Kneer, 2014).

Results of the investigations that have been conducted after the outbreak of the recent crisis indicate that there is a positive link between financial development and economic growth if the level of financial development does not exceed a critical value. Above this critical value an increase of the banking credit to GDP ratio has a negative impact on economic growth. Therefore the notion of "the vanishing ef-

fect of finance on growth" is more and more often discussed in the economic literature (Rousseau, Watchel, 2011). According to the results obtained by Cournède and Denk (2015), on the basis of OECD and non-OECD G-20 countries, an increase of the percentage of the financial sector in Gross Domestic Product has a negative impact on economic growth if it exceeds 100%. These authors listed five factors which influence the "too dynamic" growth in the percentage of financial intermediation in the economy: excessive deregulation of financial markets; relatively large percentage of credit from the banking sector in the value of all credits; larger implicit bank debt guarantees by the public authorities; lower quality of credit; and a relatively large ratio of credit for households compared to credit for enterprises. Reinhart and Rogoff (2011) and Alessi and Detken (2014) noted that if the ratio of credit to GDP exceeds a certain high level, then the probability of a recession in the nearest future is high. Moreover, Philippon and Reshef (2012) showed that a large increase in the gap between the average wage in the financial sector and the average wage in the economy as a whole leads to the vanishing effect of finance on growth. Cournède and Denk (2015) decomposed credits into credit for enterprises and credit for households and found that above a certain level, an increase of these categories might have a negative impact on economic growth, although there were differences in the strength of the impact. According to the results of the research conducted by Chakraborty, Goldstein and MacKinley (2014), an increase in mortgage credit reduced the activity of banks within the provision of credit for enterprises. Moreover, dynamic growth in the housing market resulted in a large increase in the supply of houses and the increased expansion of banks into the mortgage market resulted in lower standards of the credit awarding process. The result was a slowdown and recession (Dell'Ariccia, Igan, Laeven, 2012; Maddaloni, Peydro, 2011). Cecchetti and Kharroubi (2012), Barajas et al. (2013) and Law and Singh (2014) have also found a hump-shaped relationship between financial deepening and economic growth. This was shown by the fit obtained by fitting a quadratic function. Alessi and Detken (2014) showed that a credit-to-GDP ratio above 92% provides an important early warning of an impending financial crisis.

Próchniak et al. (2016) analysed the impact of six different variables, measuring the degree of financial development (domestic credit provided by the financial sector to GDP ratio; bank capital to assets ratio; market capitalization of listed companies to GDP ratio; turnover ratio of stocks traded; and broad money as a percentage of GDP), on economic growth. The market capitalization of listed companies and turnover ratio of stocks traded turned out to have a positive and non-linear impact on economic growth, which was in line with the law of diminishing marginal returns. Analysis for variables reflecting the performance of the banking sector demonstrated that too large a size of the financial sector (i.e. too high a volume of nonperforming loans) may have a negative impact on GDP growth.

3. Development of the financial system in the CEE countries – statistical analysis

At the turn of the 20th century, dynamic financial development was observed in both developed and developing economies. Data on the percentage of credit to private sector financial services companies in the GDP of Central and Eastern European countries shows that there was a dynamic growth in financial intermediaries (see Figure 1). In our paper, we look for an answer to the difficult question of whether the banking system has grown ‘too much’ in Europe generally, and in the CEE specifically. We want to know how much ‘too much’ is, based on the need for credit in the real economy of CEE countries. Firstly, we looked at the volume of private credit created by banks, relative to the size of the real economy. Between 2000 and 2009, the ratio of credit to GDP increased more than 44.3%. The effects of the global financial crisis then became visible in 2010, when the analysed ratio decreased by about 10 percentage points compared to the 2009 level.

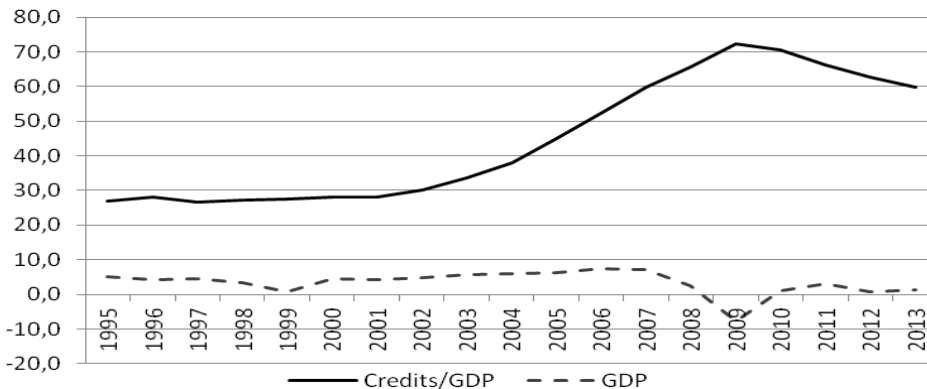


Figure 1. Median domestic credit to GDP and median growth of GDP for CEE 11 in 1995–2013 (%)

Source: own calculations based on World Bank database

Between 2007 and 2009, a negative rate of growth of real GDP was observed in 10 of the 11 countries analysed here. A positive rate of growth of real GDP was observed only in Poland. This was due to, among other factors, its strong, stable financial system (especially the banking sector). Cross-country analysis of the ratio of domestic credit to GDP and the growth rate does not support the hypothesis of a positive relation between the level of financial sector development and economic growth, since the domestic credit to GDP ratio was below 0.5 for Poland in 2009. At the same time, this coefficient was greater than 1 in the case of Estonia and Lithuania, although these countries saw very strong recessions in 2009 (for example, the change of GDP in Latvia in 2009 was –14.3%).

Some of the recent academic literature finds that the creation of private credit reduces long-term growth beyond a certain threshold. Banking systems can marginally divert both financial and human capital away from productive projects. We can see that high levels of bank credit are associated with higher levels of bank risk and systemic risk. In addition, the banking systems in some countries have reached such a size that they are too large to be bailed out by their governments in the event of a crisis. The most recent financial crisis showed that the supply of bank credit is more volatile than the supply from capital debt markets, and thus could amplify both financial and actual instability.

With the main objective of this paper being the estimation of the optimal ratio of domestic credit to GDP in CEE countries, average values of the analysed variables in four sub-periods are presented (Figure 2).

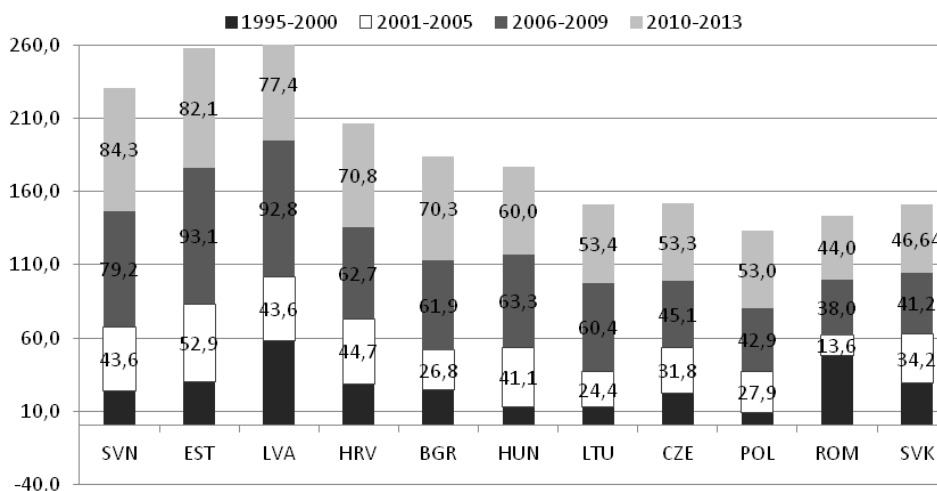


Figure 2. Average Level of Domestic Credits to GDP in Four Sub Periods Between 1995–2013 (%)

Source: own calculations based on World Bank database

In all of the countries under consideration, the highest value of the domestic credit to GDP ratio was recorded in the pre-crisis period and at the beginning of the global financial crisis (61.9% in 2006–2009), and in the euro zone during the sovereign debt crisis (64.9% in 2010–2013). The strongest credit expansion in the period 2006–2009 was observed in Estonia (93.1%) and Lithuania (92.8%), while the lowest values of domestic credit to GDP were observed in Romania (38.0%), Slovakia (41.2%) and Poland (42.9%). Similar results were recorded in 2010–2013, however in the case of Slovenia, the analysed coefficient was the largest (84.3%). It should be stressed that during the crisis period, a so-called credit gap (the difference in the analysed ratio between economies) decreased. The distance between the maximum and minimum was equal to circa 55 percentage points in the period 2006–2009, and circa 40 percentage points in 2010–2013.

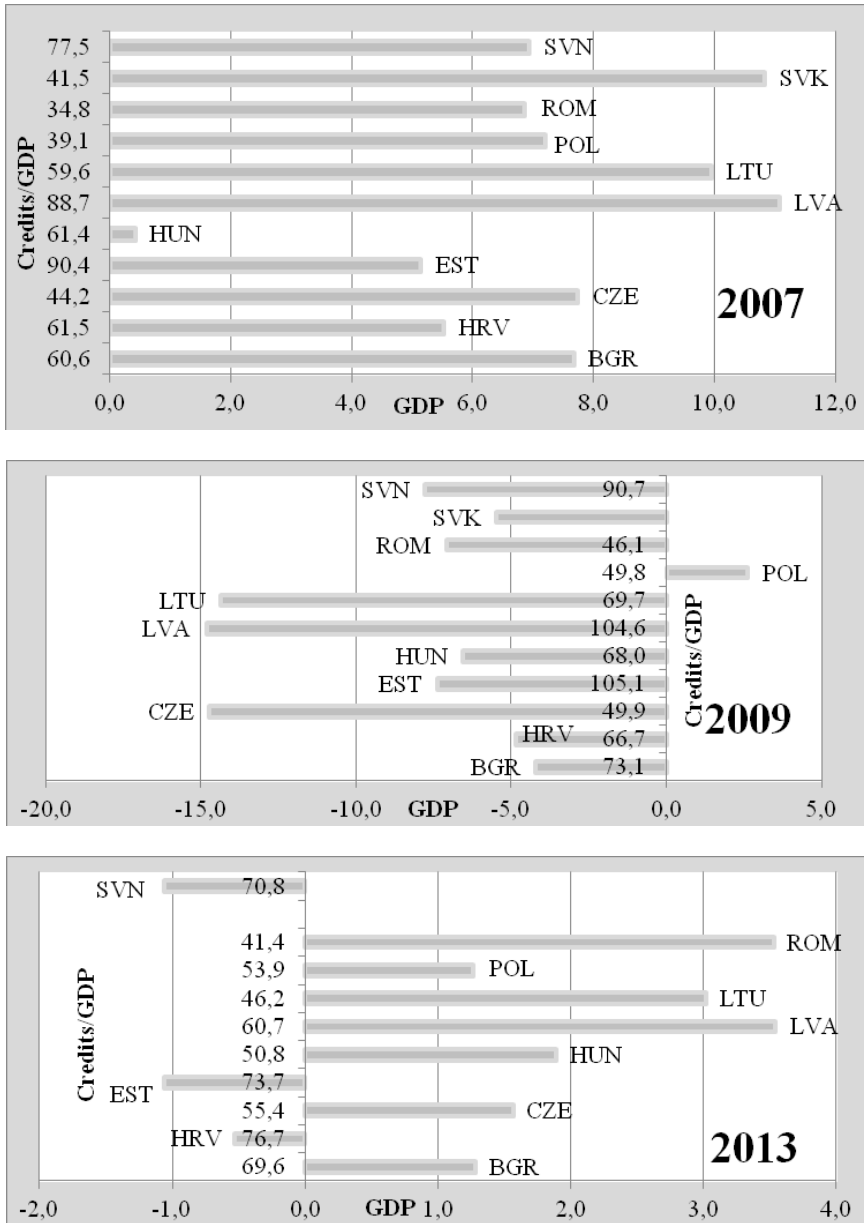


Figure 3. Domestic credits to private sector (% of GDP) vs. GDP growth (annual %) for CEE European Countries in 2007, 2009, 2013

Source: own calculations based on World Bank database

Figure 3 provides important information on the relation between the domestic credit to GDP ratio and the rate of growth of real GDP in 11 countries of Central and Eastern Europe. In 2007, the rate of growth of real GDP was positive in all of the coun-

tries under consideration. The highest growth rate was observed in the Latvia, Slovakia and Lithuania. In 2009 the positive rate of growth of real GDP was reported only for Poland, where the ratio of domestic credit to GDP was low. It should be noted that the countries with the highest value of the analysed coefficient (Croatia, Estonia, Slovenia) also recorded a deterioration in Gross Domestic Product. Therefore, checking whether a limit on the domestic credit to GDP ratio in Central and Eastern Europe actually exists, seems to be especially interesting. Moreover, it should be stressed that empirical research shows that for Poland, there is indeed such a limit (44%) (Grabowski, Maciejczyk-Bujnowicz 2016a; 2016b).

Cecchetti and Kharroubi (2012; 2015), Barajas et al. (2013) and Law and Singh (2014) after Arcand, Berkes and Panizza (2012), also found a similar hump-shaped relationship between financial deepening and economic growth. This was seen in the fit obtained by a quadratic function. As such, we decided that this relationship would be a good approximation of the semiparametric fit.

4. Testing the „too much finance” hypothesis for the countries of the Central and Eastern Europe

To analyse the impact of the domestic credit to GDP ratio on the rate of growth of real GDP and to test whether the ‘too much finance’ hypothesis is valid in the economies of Central and Eastern Europe, we propose estimation of the parameters of the following panel model:

$$Growth_{it} = \alpha_0 + \alpha_1 DC_{it} + \alpha_2 DC_{it}^2 + \mathbf{x}_{it} \boldsymbol{\beta} + \varepsilon_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \quad (1)$$

where DC_{it} denotes the ratio of domestic credit to GDP. The existence of a threshold, above which the impact of financial depth on growth is negative, requires consideration of a non-monotone relationship. Therefore, a squared value of the variable DC_{it} is included in our model. \mathbf{x}_{it} is a vector of other explanatory variables¹. To check whether the relation between domestic credit to GDP and the rate of growth of real GDP follows an inverted U-curve, the following hypothesis should be verified:

$$\begin{aligned} H_0 : \alpha_1 = \alpha_2 = 0, \\ H_1 : \alpha_1 > 0, \quad \alpha_2 < 0. \end{aligned} \quad (2)$$

¹ The selection of explanatory variables is based on the literature devoted to the determinants of growth in the countries of the Central and Eastern Europe (see e.g. Baran, 2013; Bieńkowski, Grabowski, 2017; Czasonis, Quinn, 2012) and data availability.

The optimal value of the variable DC_{it} is found on the basis of the first order condition. After estimation of the parameters of model (1), the optimal credit to GDP ratio is found on the basis of the following formula:

$$OPT^{DC} = -\frac{\hat{\alpha}_1}{2\hat{\alpha}_2}. \quad (3)$$

In the vector \mathbf{x}_{it} we should include variables that are, in general, used in models explaining the rate of growth of GDP in CEE countries². Therefore, in this vector we consider the following variables:

- 1) rate of growth of capital,
- 2) rate of growth of labour,
- 3) rate of growth of domestic consumption,
- 4) rate of growth of government expenditure,
- 5) rate of growth of investment,
- 6) rate of growth of net export,
- 7) rate of growth of Research and Development expenditure,
- 8) rate of growth of real GDP in the euro area.

The strategy of the estimation is as follows. First, we consider the pooled regression model (1). Secondly, we consider the model with fixed effects:

$$Growth_{it} = \alpha_{01} + \dots + \alpha_{0N} + \alpha_1 DC_{it} + \alpha_2 DC_{it}^2 + \mathbf{x}_{it}\boldsymbol{\beta} + \varepsilon_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T \quad (4)$$

and test for the presence of fixed effects:

$$\begin{aligned} H_0 : \alpha_{01} = \dots = \alpha_{0N} = 0, \\ H_1 : \sim H_0 \end{aligned} \quad (5)$$

using a standard F statistic:

$$F = \frac{RSS - USS}{USS} \frac{NT - (N + K + 2)}{N - 1}, \quad (6)$$

where RSS denotes the sum of squared residuals for the model (1) and USS stands for sum of squared residuals for the fixed effects model (4), K is the number of parameters in vector $\boldsymbol{\beta}$. Thirdly, we consider the model with random effects:

$$Growth_{it} = \alpha_{01} + \alpha_1 DC_{it} + \alpha_2 DC_{it}^2 + \mathbf{x}_{it}\boldsymbol{\beta} + u_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \quad (7)$$

2 We consider countries of the Central and Eastern Europe which joined the European Union in 2004 or later.

$$u_{it} = \varepsilon_{it} + \lambda_{0i}$$

and test for the presence of random effects

$$\begin{aligned} H_0 : \sigma_\lambda^2 &= 0, \\ H_1 : \sigma_\lambda^2 &> 0 \end{aligned} \tag{8}$$

using the Breusch and Pagan (1980) test. In order to compare the fixed effects model (4) with the random effects model (7), a Hausman (1978) test of specification is conducted. Using these 3 tests (*F* test for the significance of fixed effects, Breusch, Pagan, 1980 test for random effects, and the Hausman, 1978 specification test), we choose 1 of three static panel models. Since the rate of growth of real GDP in the year *t* can depend on the rate of growth in previous years, we should test for the presence of autocorrelation of error terms in the static panel model using a Breusch (1978), Godfrey (1978) test. In the case of the autocorrelation, estimation of the parameters of the dynamic panel model is considered. A systemic Blundell-Bond (Blundell, Bond, 1998) estimator is used.

For the model based on all countries, the hypothesis about the lack of autocorrelation of error terms was rejected, so the dynamic panel model was used. Table 1 presents the results of the estimation of the parameters of the dynamic panel model, the results of verification of the hypothesis (2), and the results of testing the validity of over-identifying the restrictions and autocorrelation of order 2.

Table 1. Results of the estimation of the parameters of the growth regression for the group of 11 countries of the Central and Eastern Europe. Estimates of parameters are obtained using Blundell-Bond (1998) systemic estimator

Variable	Estimate
<i>Cons</i>	-0.011**
<i>Growth_{i,t-1}</i>	0.028*
<i>EA_Growth_{i,t}</i>	0.383***
<i>Capital_growth_{i,t}</i>	0.082***
<i>Expenditure_growth_{i,t}</i>	0.038***
<i>Consumption_growth_{i,t}</i>	0.508***
<i>Investment_growth_{i,t}</i>	0.043***
<i>Export_netto_growth_{i,t}</i>	0.064**
<i>DC_{it}</i>	0.067***
<i>DC²_{it}</i>	-0.071***
Testing autocorrelation of order 2 using Arellano-Bond (1991) test	Statistic = -1.41 p-value = 0.16
Results of Sargan test for overidentifying restrictions	Statistic = 104.70 p-value = 0.11

Variable	Estimate
Testing validity of the hypothesis (2)	Statistic = 23.57 p-value = 0.00
Testing poolability	Statistic = 7.89 p-value = 0.00

Source: own calculations

According to the results of the estimation in Table 1, we can see that the rate of growth of real GDP depends on the lagged value of this variable, the rate of growth in the euro area, the rate of growth of government expenditure, and the rate of growth of consumption, investment and export nett. Variables DC_{it} and DC_{it}^2 turn out to have a statistically significant impact on the rate of growth of real GDP, and estimates of the parameters for these variables have the correct signs. The results of the Wald test indicate that an H_0 hypothesis should be rejected. This means that the relation between the ratio of domestic credit to GDP does have the shape of an inverted U-curve. In the first stage of the development of the financial market, the rate of growth of real GDP increases, but after exceeding a critical level, the increase in the domestic credit to GDP ratio results in a slower rate of growth of real GDP. The estimated optimal level of domestic credit to GDP equals:

$$OPT^{DC} = -\frac{\hat{\alpha}_1}{2\hat{\alpha}_2} = -\frac{0.067}{2(0.071)} = 0.47. \quad (9)$$

Hypothesis $\alpha_1 = \alpha_2 = 0$ is rejected, so the rate of growth of real GDP in the group of 11 countries of the Central and Eastern Europe depends on the domestic credit to GDP ratio. This relation is non-linear, with the expansion of domestic credit leading to a larger rate of growth of real GDP if the analysed ratio is below 0.47. When the ratio of domestic credit to private sector growth to GDP is larger than 0.47, the cost of repaying loans is so high that consumers do not have enough money for expenses and consumption does not stimulate growth. Moreover, a higher ratio of domestic credit to GDP has a negative impact on the stability of a country's banking sector. Therefore, in order to reach the optimal level of growth, governments and central banks in Central and Eastern Europe should take measures to help increase or decrease their domestic credit to GDP ratio.

Though there is no autocorrelation of order 2 and the over-identification of restrictions is valid, we reject the hypothesis of the stability of parameters across countries after applying the poolability test. Though the panel consisting of 11 countries has an appropriate number of observations and the GMM-estimator is efficient, we should reduce our panel. Therefore, instead of estimating the parameters for the entire panel, we will consider the estimation of parameters for 3 groups, described in Table 2. These groups are distinguished on the basis of an analysis of the rates of growth of real GDP, the correlation between the rate of growth of real GDP

in these countries and in the euro zone, the performance of the domestic credit to GDP ratio, and the history of these countries and their monetary regimes.

Table 2. Division of the group of 11 countries into sub-groups

Group	Countries	Features	Average rate of growth of real GDP	Average ratio of domestic credit to private sector to GDP	Correlation between the rate of growth and domestic credit to private sector to GDP ratio
1	Latvia, Lithuania, Estonia, Slovakia, Slovenia	Joined the EU in 2004 and entered the euro area later	0.04	0.60	0.80
2	Poland, Czech Republic, Hungary	Joined the EU in 2004, but decided to conduct their own monetary policies	0.03	0.46	0.72
3	Bulgaria, Romania, Croatia	Joined the EU in 2007 (Bulgaria, Romania) or in 2013 (Croatia)	0.03	0.48	0.68

Source: own calculations

Table 3 presents the results of the estimation of the parameters of the growth regressions for 3 groups of countries with the results of diagnostic checks. According to the results of the estimation of parameters for the first group, the hypothesis about the lack of relationship between the domestic credit to GDP ratio and the rate of growth of real GDP is rejected. In fact, estimate $\hat{\alpha}_1$ is significantly larger than 0, and estimate $\hat{\alpha}_2$ is significantly negative. Therefore, there does exist an optimal value of domestic credit to private sector growth to GDP ratio -0.48 . Although Latvia, Lithuania, Estonia, Slovakia and Slovenia are small, open economies, which record relatively fast rates of growth, the observed domestic credit to private sector growth to GDP ratio seems too large. The level of financial development in these countries might have exceeded a critical level and further increase of the domestic credit to GDP ratio does not result in faster growth of their economies. If the monetary authorities and governments of these countries had taken measures to keep the domestic credit to GDP ratio at a level of 0.48, faster rates of growth of real GDP in these countries would probably have been recorded.

Table 3. Results of the estimation of the parameters of the panel regression for the 3 groups of countries

Group	1	2	3
Model	Pooled regression	Dynamic panel model. Blundell-Bond (1998) systemic estimator	Pooled regression
Variable	Estimate of parameter	Estimate of parameter	Estimate of parameter
<i>Cons</i>	-0.000	-0.034***	-0.002
<i>Growth_{i,t-1}</i>	-	0.045*	-
<i>EA_Growth_{i,t}</i>	0.559***	0.532***	-
<i>Capital_growth_{i,t}</i>	0.051***	0.122**	0.171***
<i>Expenditure_growth_{i,t}</i>	-	-	-
<i>Consumption_growth_{i,t}</i>	0.551***	0.655***	0.572***
<i>Investment_growth_{i,t}</i>	0.080***	0.023*	0.027***
<i>Export_netto_growth_{i,t}</i>	-	0.313***	0.214***
<i>DC_{it}</i>	0.041*	0.120	-
<i>DC²_{it}</i>	-0.049*	-0.100	-
<i>OPT^{DC}</i>	0.48	0.6	-
Testing presence of fixed effects for groups 1 and 3	p-value = 0.11	-	p-value = 0.14
Testing presence of random effects for groups 1 and 3	p-value = 0.25	-	p-value = 0.27
Testing autocorrelation of order 1 for groups 1 and 3	p-value = 0.17	-	p-value = 0.22 ³
Testing autocorrelation of order 2 for group 2	-	p-value = 0.26	-

***, **, * denote significance respectively at the 0.01, 0.05 and 0.1 level of significance.

Source: own calculations

In the Poland, Czech Republic and Hungary sub-group, the results are consistent with the hypothesis of the ‘vanishing effect’ of financial development. However, the threshold above which financial depth starts having a negative effect on growth turned out to be at a higher level of 0.60. Though the financial markets in Poland, Czech Republic and Hungary are less developed than those of the CEE states belonging to the euro zone, it seems that there is space for extension of financial markets in these countries. It should be noted that the optimal values of domestic credit to GDP ratio for the first and second sub-groups of countries are obtained on the basis of different estimators. The decision to use two different estimators

3 Since there was no autocorrelation of order 1, static panel model was used for the first and third group.

results from the characteristics of the data. In the case of the second sub-group, the hypothesis about the lack of autocorrelation was rejected. Therefore dynamic panel model was chosen. In the case of the first group of countries, static panel model was appropriate.

In the case of Bulgaria, Croatia and Romania, estimates of parameters for the variables DC_{it} turned out to be not significantly different from 0, so these two variables were excluded from the final specification. This means that development of their financial systems does not have any impact on the level of growth of their real GDP. This may be due to the fact that the financial systems in Bulgaria, Romania and Croatia are still underdeveloped, interest rates are relatively high and there is much less access to credit than in the more developed CEE countries. Therefore, extension of credit actions does not have a stimulating impact on GDP growth. It seems that these countries and their financial systems must develop, in order for the relationship between financial depth and economic growth to be seen. Bulgaria, Romania and Croatia seem to place in the bottom left of the inverted U-curve.

5. Conclusions

In the literature, the prevailing belief is in the positive impact of financial development on economic growth. The recent global financial crisis showed that development of the banking system, measured by the ratio of bank loans granted to the private sector, to GDP, reaches a certain optimum level above which further increases in lending suggest that there will be a decline in GDP growth. This article attempts to determine this optimum level for the 11 Central and Eastern European countries who joined the EU from 2005 to 2013. As a result, the test group of 11 countries is not homogeneous in terms of their optimum levels of bank credit/GDP. The average for the entire sample is 47% of GDP. The results of our calculations made it possible to divide these countries into 3 sub-groups, by degree of development of their banking sectors (bank loans/GDP). We used the Blundell-Bond (1998) estimator. Latvia, Lithuania, Estonia and Slovenia have above-average optimums of 48% of GDP in the period considered. This means that the phenomenon of over-financing of these economies and further expansion of bank credit above this level in their economies has contributed to their lower GDP, and not (as expected) to further growth. According to our calculations, in Poland, Czech Republic and Hungary the optimum bank credit to GDP ratio in 2005–2013 amounted to 60%. This could mean that there is a 'financial development gap' in their economies and that they are not using the potential of their financial systems. Bulgaria, Croatia and Romania's financial systems are underdeveloped and do not play an important role in promoting their economic growth.

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Weryfikacja hipotezy „too much finance” w krajach Europy Środkowo-Wschodniej – badanie empiryczne

Streszczenie: Artykuł poświęcony jest analizie relacji między wskaźnikiem reprezentującym wartość udzielonych kredytów do PKB a wzrostem gospodarczym dla grupy jedenastu krajów Europy Środkowej i Wschodniej. Parametry modelu ekonometrycznego szacowane są za pomocą metody najmniejszych kwadratów oraz uogólnionej metody momentów przy wykorzystaniu estymatora Blundella-Bonda. Wyniki badania empirycznego pokazują, że cała grupa może być podzielona na trzy jednorodne podgrupy o różnych wartościach optymalnego poziomu wskaźnika krajowego kredytu do PKB. Wyniki oszacowania parametrów modelu paneli pokazują, że Łotwa, Litwa, Estonia i Słowacja prawdopodobnie osiągnęłyby wyższy poziom wzrostu gospodarczego, jeżeli analizowany współczynnik wynosiłby 0,48. W przypadku Polski, Czech i Węgier optymalna wartość analizowanego współczynnika wyniosła 0,6. W przypadku Bułgarii, Chorwacji i Rumunii rozwój systemu finansowego wydaje się nie mieć żadnego wpływu na poziom wzrostu realnego PKB.

Słowa kluczowe: rozwój finansowy, tempo wzrostu PKB, model panelowy

JEL: F20, F30, F43, G15, G28, C33

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