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**EFFICIENCY OF THE
FINANCIAL
INTERMEDIARIES AND
ECONOMIC GROWTH IN
CEEC**

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Andrus Oks*

Abstract

This paper presents an analytical discussion and empirical evidence of the relationship between financial sector development and economic growth among Central and Eastern European countries. Theoretical views allow for the complex relationship between the financial sector development and economic growth. Empirical evidence is presented that depending on the time period and sub-sample the correlation of the financial development with economic growth can be negative or positive. Using monthly data the causality (in Granger sense) of this process is addressed - the causality can run one way or the other, depending on the particular country.

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Introduction

The matter of relationship between financial sector development and economic growth are widely discussed among economists. Up to the moment the standard empirical research has been done with the data from OECD, South American and Asian countries. This paper attempts to look at the problem from the viewpoint of Central and Eastern European (CEE) countries.

The purpose of this paper is to determine the relationship between financial sector development and economic growth in the sample of CEEC. To reach the purpose following steps have to be taken: analysis of the theoretical relationship between financial sector development and economic growth; empirical estimation of the theoretical relationship.

Previous discussion in literature (starting with Bagehot 1873, Schumpeter 1911 and Hicks 1969 (in Levine 1997)) the relation between financial development with growth is found to be positive and causality runs from first to the latter. The intuition for their results was that financial sector offers a valuable service for the economy (for instance managing the risks, evaluating the projects and primarily committing the inter-temporal and inter-personal resource transfer (Winkler 1998). Although, Robinson (1952) asserts that growth creates demands for financial services and financial system responds to provide these services (Levine 1997).

The more recent literature, e.g. Jappelli and Pagano (1994) has emphasised the possibility that the relation between financial intermediaries` development and economic growth can be negative according to the argument provided below. In this paper I assess both possibilities and find that there can well be simultaneous interaction of both positive and negative influ-

ences. The overall result depends on how these effects counter-balance each other.

The estimation is done by the method developed from framework of King and Levine (1993) concentrates on pooled regressions and involves Granger causality test. In purposes of having more observations, monthly data is used; industrial production is taken as a proxy for GDP.

The structure of the paper is constructed as follows: I part analyses the main features of the previous literature, in the II part a mathematical model is constructed, III part presents the principles of the data analysis, the empirical result are presented in the IV part.

1. Finance and Channels to Growth

The intuitive reasoning for existence of financial sector development influence on economic growth is simplistic – financial sector uses real assets and therefore affects real economy. This paper uses the second generation of theories describing the relationship between financial sector development and economic growth, which is based on the endogenous growth theory. McKinnon (1973) and Shaw (1973) developed the first generation of these theories from the framework of the neo-classical growth theory (Winkler 1998, p.5). Neo-classical growth theory has several disadvantages in this context. The most crucial one is the fact that according to the neo-classical growth theory a change in saving and/or investment has an effect only in long run – the level of real per capita income is affected but not the rate of growth. Hence, financial sector development affects income per capita only in equilibrium but on the path of development the growth rate is unaffected.

This approach is counter-intuitive and incompatible with empirical facts, numerous researchers (Barro 1991, Levine, Renelt 1992, Asilis 1992, p.2-4, Barro, Sala-i-Martin 1995, p.433, Fielding, Miezzen 1997, p.431) conclude that there is strong positive correlation between real per capita income and

the rate of investment and saving. The new growth theory describes technological development endogenously as a by-product of physical or human capital accumulation (Fry 1995).

Today the endogenous growth theory is prevailing and the existence of the relationship between financial sector development and economic growth is set beyond the doubt by the scientists. The matters of direction, robustness and, of course, causation still provoke interest.

The way to build a theoretical groundwork is to determine the transmission mechanism between financial sector and real economy. To do so, we have to define the main functions of the financial sector. The general aim of financial sector is intertemporal, interpersonal transfer of resources (Winkler 1998, p.11). More specifically, financial sector helps firms to overcome the problems of moral hazard and adverse selection and this reduces the costs of external financing (Rajan, Zingales 1998, p. 560) and transaction costs in general (Levine 1997, p. 690).

The positive effect of financial sector development on economic growth is modelled with information gathering, resource allocation and rising liquidity (Greenwood, Jovanovich 1990), rising productivity (King, Levine 1993a), reducing of monitoring costs (Diamond 1984, Boot, Thakor 1997, Holmström, Tirole 1997, Blackburn, Hung 1999). In Greenwood and Jovanovich model financial intermediaries help agents to choose projects with higher returns. Without financial intermediaries agents could not invest in these projects because of the lack of the information and low liquidity of the project (Greenwood, Jovanovich 1990, p. 1080-1082).

These liquidity rising mechanism involve dual effect on savings. It is assumed that higher liquidity brings along higher investment returns and lowers uncertainty (Levine 1997, p.692). Higher returns cause income and substitution effect, which means that agents can invest less to earn the same income because of the higher returns, but the opposite effect, is that consumption will be substituted with savings because of the higher productivity of the capital. Reduction of the uncertainty

has also dual influence on the savings. Lower variance of the earnings causes a drop of the risk premium in the agents required rate of return, which enables more projects to be accepted. This results in rise of investment demand, rise in interest rate and increased savings. At the same time agents considering lower risks may reduce precautionary savings and this can result in drop in overall savings. As we have shown here it is not certain whether savings rate will fall or rise as a result of the increase in liquidity. This argumentation undermines the credibility of the liquidity rising models.

Even moreover, it has been argued that higher liquidity in the stock market may not encourage investment into higher return projects. Higher liquidity makes the sale of stocks easier and consequently stockowners do not have to engage in costly monitoring of the management. Problems with corporate governance endanger effective allocation of resources and reduce productivity (Levine, Zervos 1998, p. 538).

Classic articles of Jappelli and Pagano (see for example Jappelli and Pagano 1994) have laid the ground for the theory that describes negative relationship between financial sector development and economic growth. The reasoning for relation comes straightforward from the endogenous growth model. If agents cannot borrow the desired amount, aggregate saving will be higher than in the presence of the perfect capital markets. In more detail Jappelli and Pagano look at the credit rationing towards households. Being liquidity-constrained households cannot borrow effectively against their future earnings – so they save more. Increased savings means growing investments, which in the framework of endogenous growth leads to higher growth rate.

On the other hand proponents of financial development argue that liquidity constrained households have less incentives to accumulate human capital. Agents simply choose working instead of learning (De Gregorio and Guidotti 1993, De Gregorio 1993). This causes the lower economic growth in the framework endogenous growth (Barham, *et al* 1995, Cartiglia 1997).

Empirical studies do not solve the theoretical puzzle. King and Levine (King, Levine 1993b) prove that in their sample the correlation between economic growth and all the measures of financial development (presented below) is positive. One must bear in mind that this does not say anything about causality – it can run both ways: high initial level of financial development can cause higher growth or higher growth may induce the need for “bigger” financial sector. Although King and Levine (1993b) argue that they have proved that initial level of financial development predicts the future growth rate, Arestis and Demetriades (1996) show that King and Levine`s causal interpretation is based on fragile statistical basis. Furthermore they demonstrate that cross section data sets cannot address the question of causality in a satisfactory way.

Also considerable regional differences apply. De Gregorio and Guidotti proved that in the sample of Latin American countries there is a robust and significant negative correlation between financial intermediation and economic growth. They explain this relationship with the fact that in the absence of proper regulation, more financial development may be associated with a lower efficiency of investment. They conclude that the positive relationship between financial intermediation and economic growth may be reversed in the presence of unregulated financial liberalisation and expectations of government bailouts (De Gregorio and Guidotti 1992).

The empirical results of De Gregorio and Guidotti are consistent with the views of the school, which proposes that financial development hurt growth. Negative relationship has found confirming empirical evidence by some other studies (Bayomi 1993, Liu, Woo 1994).

It is reasonable to think that both the proponents and opponents of the financial development can be right to some extent. The processes described can happen simultaneously, the question is which effect is bigger. Obviously the outcome can be different in various countries/regions or time intervals.

It has been stressed that the more “mature” is the economy the less financial development affects the growth. In other words when income level rises the relation becomes weaker. Moreover, in quantitative terms the financial system is not as closely involved in the process of real capital accumulation as might have been expected. At least not in the sense that provides the funds to finance investment by productive enterprises, since by far the largest share of business investment undertaken in given period is financed internally (Winkler 1998, Hansson and Jonung 1997). Two aspects have to be stressed in case of CEEC. Firstly, in the initial stages on development financial sector was built virtually from the scratch in CEEC. Secondly, bank lending is of a crucial importance for firms in CEEC (look in Allen, Gale 1999). In this context a strong relationship between financial sector development and economic growth is anticipated in case of transition economies.

Some researchers have proposed other explanations for the empirically proven correlation between financial sector development and economic growth. Their main arguments are a) causality runs from latter to former; b) there is no real connection between financial sector development and economic growth, the correlation is just statistical; c) as firms get more specialised they increase the volume of their transactions and payments.

Rajan and Zingales investigate the possibility of the reverse causality (Rajan, Zingales 1998). They argue that certain country-specific conditions (e.g. abundance of natural resources) may give advantage to some industries (e.g. mining industry) which at the same time rely heavily on external financing. Under this kind of set up industries that depend more on external financing grow faster and this induces the development of the financial sector. In this case the economic growth leads and financial sector development follows. Their empirical analysis does not confirm this theoretical construction. Jayaratne and Strahan (1996) also reject the reverse causality in their US bank branch policy liberalisation investigation.

Levine et al (1999) and Rajan, Zingales (1998) explore the possibility that the relationship between financial sector development and economic growth is just a statistical phenomenon. Intuitively it can be explained that e.g. pharmaceutical industry relies heavily on human capital. As the level of human capital and financial sector development is closely connected it possible that the development of financial sector is a good proxy for the effect of the human capital. This construction does not appear any empirical grounds either (Rajan, Zingales 1998).

Another theoretical possibility is that firms get more specialised and they increase the volume of their transactions and payments (Galetovic 1996). Financial sector as an intermediary of these payments gets a boost by these increased transactions. According to this logic financial sector is a follower of the growth which originates from the real sector. This construction involves assumption that financial sector is not passive and the possibility that a non-functional financial sector prohibits economic growth is excluded. This means that this model is a derivative of the Greenwood-Jovanovic (1990) model where both financial sector development and economic growth were endogenous.

To summarise relevant theories one must admit that there is shared view that financial sector development and economic growth are positively related. There is also sufficient evidence that some aspects of financial development can hurt growth. These aspects may be connected with a specific region or specific elements of the development process. The possibilities of reverse causation and other explanation for the correlation have not found sufficient empirical support.

2. Model

Following theoretical model is developed from the Berthelemy and Varoudakis (1996), Sanchez-Robles (1997) also Jappelli and Pagano (1994) models. It is an endogenous growth model with households, firms and financial sector.

To model the behaviour of households we have made following assumptions. The initial level of population is normalised to one and it is constant. Households hold claims (V) against financial sector which gain a real interest r . Real interest rate r equals marginal return on capital, which differs from nominal marginal product of capital by the cost of financial intermediation. This construction implies liquidity constraints for the households and firms, as they cannot get the loan with the same interest rate as they get from the deposit (Bacchetta, Gerlach 1997).

Agents maximise the present value of their intertemporal utility function subject to the budget constraint:

$$\max_{c_t} U_0 = \int_0^{\infty} \frac{C_t^{1-s} - 1}{1-s} e^{-rt} dt \quad (1a)$$

$$\dot{V}_t = rV_t + w - C_t, \quad (1b)$$

where: U stands for utility, s represents risk preference, ρ is a discount rate, V is a amount of assets, \dot{V} is a change in amount of assets in time, w is real wage, C is consumption. Preferences are assumed to be standard Ramsey (1928) type to ensure constant interest rate and consumption growth in steady state (Barro, Sala-I-Martin 1999). Equation 1b represents budget constraint – change in assets \dot{V} equals interest income from assets plus wage income minus consumption.

Firms use bank loans as the only source for external financing. Production technology has constant returns to scale on capital and labour. To model explicitly endogenous growth we use following function:

$$A_t = AK_t^h, \quad (3a)$$

Where: A is level of technological development and K_t is amount of capital in the economy. According to this function the level of technology is determined by the amount of capital in the economy (Jappelli, Pagano 1993). This behaviour is caused by externalities in the economy. Firms are competitive

and maximise profits; A_t is given from their viewpoint. The aggregate production function goes is:

$$Y_t = AK_t^{1+h}, \quad (3b)$$

Economies of scale are dependent on the value of η : if $\eta=0$, then the economy is facing constant returns to scale; if $\eta > 0$, increasing returns to scale. To model the influence of financial sector we make additional assumption that productivity depends on financial sector effectiveness. The easiest way to model this is to add a coefficient b , which has a property to increase together with the growing effectiveness of the banking sector (Sanchez-Robbles 1997 lk.336).

$$Y_t = bAK_t^{1+h}, \quad (4a)$$

Profit maximising condition for the firm is therefore:

$$(1+h)bAK_t^h = R = r(1+i), \quad (4b)$$

This is derived by equalising marginal product of capital with real interest rate. R is the interest rate for the bank loan. Denoting i as a mark-up of banks we get the arbitrage condition between deposits and productive capital $R=(1+i)r$ (Berthelemy, Varoudakis 1996 lk.303). The distinction between borrowing and lending rates allows modelling the banking efficiency considering the intermediation costs. Mark-up i shows the resources consumed in the process of financial intermediation. Banks with bigger mark-up are more inefficient and thus more costly for the economy. A significant difference between borrowing and lending rates implies inefficient financial sector as well as the presence of liquidity constraints. In other words, there is a negative relationship between mark-up i and efficiency b .

For simplicity we assume that on average banks earn zero profits. This assumption is generally plausible if you consider the intensive competition, it also goes along with relevant Salop (1979) model. In case of CEEC there is another possible reasoning derived from the fact that it is empirically proven that

banks have tended to accumulate near zero profits along the transition so far.

Implementing optimal control techniques, we construct Hamil-

$$\text{tonian: } H = \frac{C_t^{1-s} - 1}{1-s} + \mathbf{I}(rV_t + w - C) \quad (5a)$$

And solve it by taking derivatives with respect to C :

$$C_t^{-s} = -\mathbf{I} \quad (5b)$$

And with respect to t :

$$sC^{-s-1} \dot{C} = \dot{\mathbf{I}} \quad (5c)$$

By dividing (1e) with (1d), we get

$$\frac{\dot{\mathbf{I}}}{\mathbf{I}} = -s \frac{\dot{C}}{C_t} \quad (5d)$$

Here we have to consider the transversality condition, which ensures that, consumers do not have capital at the end of their lives or this capital is for free. Transversality condition guarantees that consumers do not accumulate infinite amounts of debt (Barro, Sala-i-Martin 1999 p.65).

$$\lim_{t \rightarrow \infty} \mathbf{I}_t k_t = 0 \quad (5e)$$

Assuming that marginal product of capital is equal to real interest rate the following is true.

$$\frac{\dot{\mathbf{I}}}{\mathbf{I}} = \mathbf{r} - r \quad (5f)$$

Setting (1f) equal to (1g) we get a standard Keynes-Ramsey condition:

$$\frac{\dot{C}_t}{C_t} = \frac{1}{s}(r - \mathbf{r}), \quad (5g)$$

which says that consumption growth depends positively on the difference between real interest rate and discount factor. We substitute the deposit interest rate to the Keynes-Ramsey condition. Assuming that the labour force stays constant we can write $\dot{K}/K = \dot{Y}/Y = \dot{C}/C = g$ (Romer 1986). From that we deduce socially optimal growth rate:

$$g = \frac{1}{s} \left[\frac{(1+h)bAK_t^h}{1+i} - r \right] \quad (5h)$$

This result implies the following. The larger the intertemporal elasticity of substitution the higher the growth rate of economy. Economy grows on the condition that marginal product of capital is higher than discount factor. Marginal product of capital depends positively on the financial sector efficiency – if b grows g will increase too.

The relationship between economic growth and liquidity constraints is negative, as the mark-up of banks $1+i$ which also describes liquidity constraints is negatively related to g . One must consider that financial efficiency b and liquidity constraints $1+i$ are interrelated.

We do not model the fixed costs for the financial intermediation, but in accordance with the Khan model (Kahn 1999) it is still possible to argue that smaller scale financial sector has higher costs compared to larger scale. This construction allows the existence of the multiple equilibria.

First equilibrium can be described as an economy with efficient banks, low mark-ups and high economic growth rate. Second – “bad” – equilibrium can be characterised with small inefficient banking sector with high mark-ups, which lead to low economic growth.

3. Data and methodology

All the data used in this research come from International Financial Statistics (CD-ROM issue 1999) released by the International Monetary Fund. Data is used as follows: Bulgaria (1992-1997), Czech Republic (1993-1999), Estonia (1992-1999), Hungary (1992-1999), Latvia (1993-1999), Lithuania (1993-1999), Poland (1992-1999), Romania (1992-1998), Slovak Republic (1993-1999), Slovenia (1992-1999),

CEE countries do not provide an ideal data set for testing macroeconomic time series because these countries are generally referred as transition economies. And the process of transition has not lasted very long (pre-transition data is not available and certainly not comparable) – so time series is rather short, but on the other hand panel data can be used.

Above all one can question if CEE countries are forming a group with similar characteristics so that they can be analysed conjunctly. The considerable differences among CEEC have to be considered. The speed and the current level of the financial development could be crucial, but those indicators are hardly directly comparable. A possible measure for similarity and also the effectiveness of banking sector is the ratio of “bad loans” to the overall lending (see Table 1).

First of all, it is clear that the countries with high financial sector development are not necessarily also with high credit losses and vice versa. The amount of non-performing loans does not correspond solely to the effectiveness of the banks but still to some extent it characterises quality of the banking sector. As the table clearly implicates the differences among the CEEC are remarkable (if we believe the differences in losses are not resulting just from the different measurement principles).

Estonia has had the outstanding loan quality throughout the provided period (banking sector crashes took place before 1994 – so these could be unobserved) and in the 1997 Hungary had reached comparable level. Countries with poor situation in this sense are Romania, Slovak and Czech Republic and Lithuania;

these countries have had bad loan ratio on 1/3 level for most of the period.

Table 1.

**Non-performing loans in CEE countries,
percentage of total loans**

Country	1994	1995	1996	1997	1998
Bulgaria	7	13	15	13	13
Croatia	12	13	11	10	14.6
Czech Republic	34	33	28	26.5	26.7
Hungary	18	10	7	4	5.9
Poland	29	21	13	11.5	11.5
Romania	19	38	48	57	34.2
Slovak Republic	30	41	32	33	44.3
Slovenia	22	13	14	12	11.5
Estonia	4	3	2	2	4
Latvia	10	19	20	10	6.3
Lithuania	27	17	32	28	12.9

Source: Transition Report 1999 EBRD

In analysing the relationship between financial development and growth different measures for financial sector efficiency are used as exogenous variables:

Ratio of bank credit to the private sector to GDP (*CREDIT*) measures the magnitude of the banking sector;

Ratio of claims on the private sector to domestic credit (*PRIV*) measures the role of most effective part of the commercial banks' loan portfolio – loans to the private sector;

Ratio of domestic credit issued by deposit banks to domestic credit issued by deposit banks and central bank (*CENTRAL*) measures the role of the central bank in lending activities. Less loans issued by CB is preferable as commercial banks are assumed to be able to pick better projects;

Wedge between interest rate of the loans and the deposits (*WEDGE*) measures the amount of resources absorbed by the banking sector.

In order to have more observations, monthly data is used. Industrial production is taken an endogenous variable (as a proxy for GDP). All the indicators are seasonally adjusted using the moving average technique. The estimation is done by the method developed from framework of King and Levine (1993) concentrates on pooled regressions and involves Granger causality test.

4. Empirical results

Hypothesis 1.: Financial sector development and economic growth coincide in CEE countries.

To test the hypothesis industrial production index is regressed against several indicators of financial efficiency. The empirical model is following:

$$Ind_{tj} = \mathbf{a}_j + \mathbf{b}FinEf_{tj} + \mathbf{e}_{tj},$$

where Ind_{tj} is industrial production index on period t for country j.

$FinEf_{tj}$ is indicator of financial efficiency on period t for country j. Indicators are listed in the previous chapter.

Theoretically it is anticipated that present value of the industrial production index depends on the past values of financial effi-

ciency indicators since monthly data is used and even moreover, some authors have suggested that this could indicate causal relationship. To capture this effect, lag values are included in the regressions. Only statistically significant lag values are presented. First of all we regress industrial production index against loans to the private sector:

$$Ind_{ij} = 0.06Credit_{t-1j}^{***} + 0.06Credit_{t-12j}^{**} + 0.74AR(1)^{***} \quad (2.86) \quad (2.38) \quad (25.17)$$

t-statistic (2.86)

(2.38)

(25.17)

Adj. $R^2 = 0.80$ DW = 2.38 Nr. of observations: 515

This result shows a statistically significant positive relationship between industrial production index and loans to the private sector. We check the sensitivity of this result to the sub-period and sub-samples. The period is divided into recession at the beginning of the transition and growth period ca 2-4 years later depending on the country.

In the regression corresponding to the recession period several lagged indicators appear to be statistically significant. Interestingly most of these have negative coefficients. This relationship implies that an increase in lending was followed by the growth in industrial production during the considered period. This result could be confirming the causal influence running from financial sector development to economic growth, but it is also known that during this period financial sector was inefficient and numerous bankruptcies occurred. This result is in line with results of Jonston and Pazarbasiogly (1995). They stated that during the recession there seemed to be negative relationship between expansion financial sector expansion and economic growth. Transition countries' conditions also apply – short-term fluctuations in investments are considered relatively unimportant because of the low level of exploitation of production inputs and inherited inefficiencies (Havrylyshyn, *et al.* 1998, p. 10) The views of Jappelli and Pagano (1994) are supported by this empirical finding.

The growth period results are similar with the results of the original regression. The variables with one month and 11-month lag appear to be statistically significant in the regression for the growth period. This indicates positive relationship between amount of loans and economic growth. This result has straightforward intuitive explanation. Short-term (working capital) investment induces higher production already in the next month; longer-term investment e.g. in the production facilities affects the growth numbers in a year time. These interpretations can be considered only by assuming the causal relationship between financial sector development and economic growth with the direction from the former to latter. This matter will be investigated later.

Regressing different sub-groups also help to check the robustness of the results. The countries are divided into two groups by the geographic criteria. First group contains Central European countries and the second group consists of Baltic countries. In case of Central European countries no discrepancy is observed from the original equation as opposed to Baltic countries which indicate some negative effects in the regression. *CREDIT* with five-month lag has a negative sign additionally to the one-month lagged coefficient with positive sign; the total effect is still positive.

To check the effects of credit losses, the sample is divided into high and low loss sub-samples. So that Croatia, Czech Republic, Lithuania, Romania and Slovakkia are in the high loss sub-sample and all the others belong to the low loss group. In case of the high credit loss countries the regression coefficient is similar to the one in the original regression, but the regression coefficient for the low credit loss countries (0.32) indicates a much stronger connection between financial sector development and economic growth.

Next step is to regress the industrial production index against indicator *PRIV*:

$$\log Ind_{ij} = 0.13 \log PRIV_{ij}^{***} + 0.84 AR(1)^{***}$$

t-statistic (3.27) (36.54)

Adj. $R^2 = 0.83$ DW = 2.50 Nr. of observations: 488

In the previous regressions both dependent and independent variable were indexes, in here the independent variable is a ratio. It is possible to argue that the relationship between index and ratio is more complicated than linear, that is why natural logarithm is used to capture this effect. This regression describes 83 percent of the variance in industrial production. It has to be considered that a large part of description is determined by the component AR(1). The indicator *PRIV* behaves according to the expectations as it has positive and statistically significant coefficient.

For the study of sensitivity the recession and growth period, Central European and Baltic countries are studied separately. Both the recession and growth coefficients are positive, statistically significant and have about the same value. In case of Central European countries the relationship is positive, but in case of Baltic countries some negative effects show up, even moreover, the total effect appears to be negative. The latter result indicates that there could have been some problems with the effectiveness of the loans to the private sector in these countries during the observed period.

The regression coefficient in the sub-sample of the low credit loss countries is similar to the one in the original regression. In the regression of the high credit loss countries several lagged variables appeared to statistically significant, the total effect is positive (0.38). This result indicates that the share of private sector loans is more important in case of high credit loss countries.

As a next step we analyse the relationship between the ratio of loans issued by private commercial banks to loans issued by central bank and industrial production:

$$\log Ind_{ij} = 0.46 \log CENTRAL_{t-1j} *** + \\ + 0.28 \log CENTRAL_{t-3j} ** + 0.03 AR(1) ***$$

t-statistic (3.25) (2.08) (31.97)

Adj. $R^2 = 0.84$ $DW = 2.51$ Nr. of observations: 467

In this regression the indicator *CENTRAL* with lagged (one and three periods) coefficients appear to be statistically significant. The signs of the coefficients are the same as expected. It means that the loans issued by commercial banks are more productive than the loans issued by central bank. The value of the coefficients is higher than the *CREDIT and PRIV*, this indicates that the indicator *CENTRAL* affects the behaviour of the industrial production on a grater scale.

In the regression reflecting the recession period the lagged variables with lags from one period to eight appear to be statistically significant. Most of the coefficients have negative signs, but the total effect is still positive. This result suggests that there could have been some problems with the effectiveness of the commercial banks during the recession period. Moreover, it could well have been that in some period the loans from central bank have been more productive. During the growth period and in case of different areas the size and signs of the coefficients match the expectations.

The share of private banks seems to be especially important in case of low credit loss countries, as the regression coefficient is 2.25. The result for the high credit loss countries is the same as in the original regression.

Finally, the wedge between loan rate and deposit rate is regressed against industrial production index:

$$\log Ind_{i,t} = 0.01 \log (WEDGE_{t-2,j})^{**} + 0.83 AR(1)^{***}$$

t-statistic (2.00) (37.05)

Adj. $R^2 = 0.81$ $DW = 2.52$ Nr. of observations: 463

Exogenous variable with two period hg appears to be statistically significant in this regression. The sign of the coefficient is against the expectations positive. This result can be interpreted so that if the wedge between loans and deposits is increasing,

then the economic growth is picking up. This result is hard to explain as the increase in *WEDGE* means the drop in effectiveness of the banks and the rise in liquidity constraints and it is difficult to imagine how can these developments speed up the economic growth.

The same result confirms in case of recession and growth period and in the sub-sample of Central European countries. This result could be used as a proof for the theories explaining the negative relationship between financial sector development and economic growth.

Another possibility to explain this result is connected with the high costs of building the financial infrastructure. The observed countries started the process of transition virtually without the financial sector; to create one is very costly. If the wedge between the loan rate and deposit rate (operation margin) is low (for instance due to the high competition or/and low bargaining power), then it is not possible to finance substantial investments from the cash-flow. This may result in underdevelopment of the financial sector and this may cause low growth rate of economy.

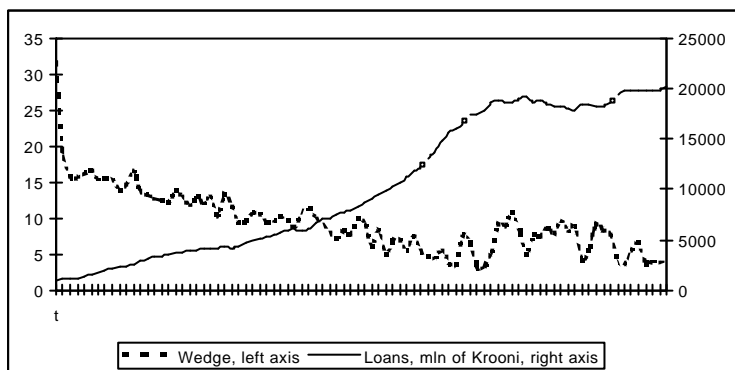
This result also rises the argument for possibility of existing banks charging monopoly interest rates because of the entry barriers of additional banks under the high growth of loan demand. To capture this effect we straightforwardly visualise the behaviour of the wedge and loans over time. We find that the developments of these indicators are remarkably similar across the countries, therefore we only present the graph for Estonia. This simplified method allows us to argue that banks did not raise the wedge when the loan demand was rapidly raising. So that, the proposition of temporary monopoly profits does not seem to hold.

In the sub-sample of Baltic countries only coefficients with negative signs appear to be significant. Contrary to the previous samples this result suggests that the relationship between banking sector efficiency and economic growth is positive.

There appear to be mixed results in the case of sub-samples of credit loss. In the sub-sample of low credit losses only variables with positive coefficients turn out to be statistically significant, but in case of high credit loss countries the only significant coefficient is negative.

Graph 1.

Loans and interest rate wedge in Estonia, 1993-2000



Source: IMF, authors calculations

Hypothesis 2.: Financial sector development causes economic growth in CEE countries.

The hypothesis of positive relation between financial sector development and economic growth is confirmed by the analyses. Unfortunately it is not possible to ascertain the causal relationship between the indicators. Granger's causal relationship test is inconclusive, as it gives different results for different countries.

In case of Bulgaria, Czech Republic, Estonia and Poland test indicates the causal relationship to run from financial sector development to economic growth; in case of Latvia, Lithuania, Slovak Republic and Slovenia economic growth seems to cause

financial sector development. Because of that, it is impossible to propose that financial development cause economic growth. This gives reason to reject the hypothesis 2. Therefore, conclusions that involve the direction of causality must be handled as suppositional.

Conclusions

In this paper we present evidence that depending on some factors the relationship between financial development and economic growth can be ambiguous. Using the monthly data, the causality (in Granger sense) of this process is addressed - the causality can run one way or the other, depending on the particular country.

The summarised results for regressions between different indicators of financial sector development and industrial production are following:

If *CREDIT* rises one unit then industrial production rises 0.12 units;

If *PRIV* rises one per cent then industrial production rises 0.13 per cent;

If *CENTRAL* rises one per cent then industrial production rises 0.74 per cent;

If *WEDGE* rises one per cent then industrial production rises 0.01 per cent.

Most of the results of the thesis are in accordance with the main findings in the previous studies for the different sample of countries. Hence, one may conclude that the transmission mechanism of financial sector development to the real economy tends to be universal across the countries. Even so, there are considerable differences among CEEC countries, the relationship between financial sector development and economic growth seems to be alike.

We devoted much attention to check the robustness of our results. We created sub-samples according to recession and growth period, Central European and Baltic countries as well as

low and high credit losses. Sub-sample regressions indicated some sensitivity towards recession period and Baltic countries.

We cannot present hard evidence on the effects of credit losses as we had mixed results from the regressions. The connection between financial sector development and economic growth appears to be relatively stronger in countries of low credit losses when measured by *CREDIT* and *CENTRAL*. The same is true in countries with high credit losses when measured by *PRIVATE* and *WEDGE*. This could be interpreted as an indication of the fact that problem of high credit losses arises in the situation of low ratio of loans channelled to the private sector as well as in case of high interest rates.

This research could be improved by expanding the mathematical model to cover open economy effects. Introducing more advanced methods of econometric analysis could contribute substantially. Also, a data of even one additional year would rise significantly the credibility of the results.

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KOKKUVÕTE

Finantsvahendajate efektiivsus ja majanduskasv Kesk- ja Ida-Euroopa riikides

Finantsvahendajate efektiivsust ja selle suurenemise mõju majanduskasvule on paaril viimasel aastakümnel palju uuritud. Selle tulemusena on välja töötatud mitmeid teooriaid, mis kirjeldavad finantssektori arengut, selle mõju erinevatele majandusüksustele ja arengu toetamise vajadust. Siiani on vaid vähesed uuringud pööranud tähelepanu finantssektori ja majanduskasvu seose temaatikale siirderiikides. Olemasolevad uuringud on kas mingile kitsale aspektile keskendunud või on tegemist pealiskaudsete ja ilma kvantitatiivse analüüsita uuringutega.

Siiski on mitmed autorid rõhutanud, et selle temaatika uurimine Kesk ja Ida-Euroopa (KIE) riikides on mitmetest asjaoludest tulenevalt oluline ja aitaks kinnitada või ümber lükata teiste riikide andemete põhjal saadud tulemusi. Üheks objektiivseks põhjuseks tõsiseltvõetavate uurimuste puudumisele käesoleva ajani on kindlasti probleemid statistiliste andmetega. Esineb raskusi arvandmete kättesaadavusega, kuid põhiline probleem on seotud andmerea lühidusega. Käesolevas uurimuses on arvandmete vähesust kompenseeritud ühendandmete analüüsi ja kuiste andmete kasutamisega. Käesoleva töö uudsus seisneb likviidsuspiirangute ja majanduskasvu seose uurimisobjekti laiendamises Kesk- ja Ida-Euroopa riikidele.

Artikli teoreetilise osa koostamisel on toetatud ingliskeelsetes teaduslikes artiklites ja monograafiates kajastatud seisukohtadele ning empiirilistele uurimustele finantssektori arengu ja likviidsuspiirangute ning majanduskasvu seoste kohta. Teoreetilise mudeli püstitamisel kasutati Jappelli ja Pagano, Berthelemy ja

Varoudakise ning Sanchez-Robblesi mudeli osiseid. Empiirilisel analüüsil toetuti olulisel määral Kingi ja Levine uurimuste metoodikale. Töö empiirilises osas kasutatakse ühendandmete regressioonanalüüsi ja Grangeri põhjusliku seose testimise metoodikat.

Kokkuvõtlikult saab käesoleva artikli põhjal teha järgmised järeldused:

1. Finantssektori areng ja majanduskasv on positiivselt seotud, kuid põhjusliku seost ei saa kasutatud andmete ja metoodika abil välja tuua.
2. Erasektorile väljastatud laenumahtude kasv toob vaatlusalustes riikides kaasa majanduskasvu kiirenemise.
3. Erasektorile väljastatud laenude osakaalu tõus toob vaatlusalustes riikides kaasa majanduskasvu kiirenemise.
4. Keskpanga poolt väljastatud laenude osakaalu langus toob vaatlusalustes riikides kaasa majanduskasvu kiirenemise.
5. Pangalaenu ja deposiidi intressimäärade vahe tõus toob vaatlusalustes riikides kaasa majanduskasvu kiirenemise.
6. Finantssektori arengu ja majanduskasvu vaheline seos oleb majanduse arengutsüklitest ning esines erinevus regioonide vahel, kuna Balti riikide tulemused erinevad kolmel juhul neljast Kesk-Euroopa riikide tulemustest. Seega tulekski neid perioode ja regioone analüüsil eraldi käsitleda.
7. Teostatud analüüsi tulemused sarnanevad teiste riikide andmetel koostatud analoogsete uuringute põhiliste tulemustega. Seega võib järeldada, likviidsuspiirangute olemasolu ning finantssektori arengu ülekandumise mehhanism reaalmajandusse on sarnane olenemata vaadeldavast riigist või riikide kogumist. Peale selle võib nentida, et kasutatud metoodika sobib sellise uurimuse läbi viimiseks.