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OPTIMIZING THE LEVEL OF BANK CREDIT TO PROMOTE ECONOMIC GROWTH. IMPLICATIONS FOR POLAND

Summary: Services of the financial sector is one of the most important catalysts of economic growth. The main focus is the analysis of one of the elements characteristic and strongly interacting in recent decades, the participation of credit intermediation in promoting economic growth. The Global Financial Crisis has affected the changes in the architecture of the global financial system. In this paper the main attention is directed towards trying to optimize the bank credit to GDP ratio in the Polish economy We obtained that the optimal level of financial depth is 0.43 in the case of Polish economy. If the financial depth is below this level then it has positive impact on the economic growth. Above this level, financial system in Poland seems to be "too large" compared to the size of the domestic economy. Above this line the financial development hits negative social returns.

Keywords: financial development, economic growth, credit, growth model.

Introduction

The financial system in any modern market economy plays an important role. Type of the financial system and its development should determine in the long term, economic growth of countries. Relations between financial development and economic development are the subject of research of many authors. The issue of changes in both structural and institutional financial systems is still valid. Permanent changes taking place in the financial markets do not stay in isolation from the real economy. The Global Financial Crisis has affected the

changes in the architecture of the global financial system. This aspect is particularly important and valid starting point for a deeper and broader analysis of the impact of the financial sector and other parts of the financial system one economic development. There are feedback loops between the financial system and its development and the development of other sectors of the economy. In this paper the main attention is directed towards trying to optimize the bank credit to GDP ratio in the Polish economy. The analysis was made on the basis of an analysis of literature to compare the degree of development of selected economies, market depth and to determine the role of financial development in the development of modern market economies.

In order to find an optimal level of the financial depth, parameters of the econometric model of the growth rate in Poland (assuming quadratic function) are estimated. In this growth model standard variables, – which are commonly used in growth regression – are included. In order to test the hypothesis about the existence of the optimal point, on parameters concerning the level and square of financial depth, restrictions are imposed.

In the literature, theoretical debate about the impact of financial development on economic growth dates back to the 70s nineteenth century and early twentieth century. Historically, economists have focused their attention on research relationships around development of banks and economic development. W. Bagehot [1873] and J. Schumpeter [1911], are considered as the pioneers of research on the impact of development banking system in the long-term rate of economic growth and the search for relationships between them. The authors of this study hypothesize that providing services the financial sector is one of the most important catalysts of economic growth. These services in the economy are based on a reallocation of savings from investments having relatively lower income with a higher rate of return, at the lowest possible transaction costs and an acceptable level of risk. J. Schumpeter analyzed the economic opportunities that arise as a result of the activities undertaken by financial intermediaries in investments in new technologies. Using their advantage in addition to financial intermediaries have better and cheaper access to information, including your hand tools for assessing technological innovation and its implementation in the each corporations. At the time, particularly the influence of banks on economic development was significant.

Among some economists there is also an opposite trend dressing causal relationship between the development of financial markets and economic growth. It has been pioneered by J. Robinson [1952, p. 86], who noted that banks passively react to economic growth saying, "where enterprise leads, finance fol-

lows". According to R. Solow, there is no causal relationship between financial development and economic growth. He said that the long-term rate of economic growth is the result of technological advances. Contemporary representative of this trend is R.E. Lucas, who claims that economists overestimate the role of the financial system, calling the phenomenon simply "badly overstressed".

In the last several years, research on the relationship taking place between financial development on economic growth were rapid acceleration, especially in the second half of the 1990s. The issue of research focused in an area that has always accompanied the economy, namely the area of the financial system and its impact on the economic development of countries.

Growth theory assumes that the interest rate plays a major role in balancing economic savings and investments. According to the neoclassical Golden Rule optimal level of economic growth equals real interest rate. For a long time it was thought that the model of the financial sector is not important for economic decisions because of excellent markets, the financial sector does not produce anything.

The emerging controversy between neoclassical approach and endogenous growth theory meant that followed the revival and growth of interest in growth theory. From the point of view of the theory of neoclassical economic growth, it is determined by the accumulation of factors of production and technical progress, potentially allowing a role in conditions of limited capital resources, which plays an accumulation of capital. Endogenous growth theory assumes the leading role of the entrepreneur and innovation, through followed the optimal allocation of capital.

1. Review of the finance – growth literature and empirical studies

Financial development does not occur in a steady and continuous way. This is demonstrated by other studies [Demirgüc-Kunt, Maksimovic, 1998; King, Levine, 1993; Jayaratne, Strahan, 1996; Rajan, Zingales, 1998]. Among the above economists on this issue, there is a common – as is clear from the study – the belief that the development of domestic financial sectors contributes to the economic development of a given economy.

The authors took in a broader aspect of the presentation of key to many researchers phenomenon of financial development and its relationship with economic growth. The starting point for these considerations is the thesis that the level of financial development is a good predictor of the level of future economic growth, capital accumulation and technological change in the country. Basing

conclusions on an analysis of data in many countries, under which the financial development as well as its lack can make a certain pattern (possibly optimal), toward which many developing countries but also the most developed countries approach. The experience for many countries may constitute a reference point for economic policy in the financial system and the rate at which these changes should occur.

R. Levine, N. Loayza and T. Beck [2000] as well as T. Beck, R. Levine, N. Loayza [2000] in their studies have used linear models, and recent studies relate to the effect of financial development on the accumulation of capital, increase productivity or real GDP per capita growth. The authors believe that the size of these variables may significantly depend also on other factors. Rioja and Valev [2004a] using the same method and data research found that financial development stimulates economic growth in rich countries in the first place by increasing efficiency, while in developing countries, financial development is first raised the level of capital accumulation. In further analyzes. Rioja and Valev [2004b] discovered that this effect is non-linear. Economy with a very low level of financial development experience very low levels of capital accumulation accelerated, while in rich countries, the impact is much greater.

The attempt to explain the cause of the linearity of the relationship between financial development and economic growth have taken their research [Rousseau, Wachtel, 2002]. They observed that the positive effect of financial development on economic growth is decreasing with the increase of the inflation rate. Also N. Loayza and R. Rancière [2006] surrendered empirical analysis of the relationship between financial development and economic growth. In his study of the effect of the impact of financial development on economic growth they were divided into short-term and long-term effect. They noted that the sharp rise in short-term bank lending may be a signal of the coming financial crisis and economic stagnation. They use variable Private Credit/GDP as a measure of the development of financial intermediation and came to the conclusion that there is a positive long-term relationship between financial development and growth, while in the short-term general, the relationship is negative. A great number of papers discuss the macroeconomic effects of credit booms (see e.g. [Mendoza, Terrones, 2012]). There also exists extensive evidence that financial crises are often preceded by domestic credit booms (see e.g. [Schularick, Taylor, 2012]).

Some empirical studies suggest that very high credit relative to GDP may lower economic growth. However, depending on criteria and circumstances, studies highlight advantages of both bank-based and market-based financial systems (see [Arcand et al., 2012]). Their analysis according to the set-up described

in Beck and Levine [2004] covers the period 1960-2010. The relationship between credit to the private sector and growth is concave and non-monotone. Finance starts having a negative effect on growth when credit to the private sector reaches 100% of GDP [Arcand et al., 2012]. Other researchers used panel regressions on a sample of 50 advanced and emerging countries over the period 1980-2009. The level of financial development is good only up to a point, after which it becomes a drag on growth. For private credit extended by banks, the turning point is closer to 90% of GDP, lower than for market-based credit [Cecchetti, Kharroubi, 2012].

The last global financial crisis again showed some irregularities in the functioning and development of the financial sector and its overemphasize impact on economic growth. In the 1970s, the results also confirmed expectations about the relationship between the financial sector and economic growth [Minsky, 1974; Kindleberger, 1978]. It was thought that they might be exaggerated. The recent crisis has shown that both the stability of the financial system and the economic balance affects the rate of credit growth. If in the long run credit growth rate is significantly higher than GDP growth, this may lead to disequilibrium in the economy, especially when there is a feedback loop between credit growth and property prices. Monetary policy, assisted by the macro-prudential policy should prevent unstable booms in mortgage markets, since their collapse can lead to severe and prolonged reduction of economic growth.

It was noted that over the past three decades, the size of the financial sector in the US to nominal GDP has increased six times faster. That was the basis to put forward a proposal which states that "instead of being a servant, finance had become the economy's master" [Wolf 2009]. In the literature, there exists sector development boundary, beyond which the interaction and the development of the financial sector to GDP is negative and vanishing effect.

Other studies show the negative effect of impact of the financial system on economic growth and, more specifically, refer this request to the impact of directed credit to the private sector (financial depth) on GDP. They noted that the economies in which the level of credits reaches 100% of GDP, then vanishing and the negative effect of the impact of credit on GDP of the economy [Arcand, Berkes, Panizza, 2012; Rousseau, Watchel, 2011]. The authors applied their research to different methodological approaches (simple cross-sectional and panel regressions as well as semi-parametric estimators), which were in line at the sought optimum of financial depth in the range between 80-100% of GDP, depending on the length of the sample of data.

2. Empirical growth model enabling testing „too much finance" hypothesis

2.1. Theoretical and methodological approach

A starting point in the analyses of economic growth is the following neo-classical production function (see e.g. [Tokarski, 2009; Chiang, 1994]):

$$Y = F(K, L).\tag{1}$$

In equation (1) Y, K, L denote output, capital and labour respectively. On the basis of the foregoing function so called Solow residuals (see [Solow, 1956]) are derived in order to describe the rate of technological progress in economy (see [Harourt, 1975]). These residuals are used in the calculations of total factor productivity (see [Welfe, Welfe, 2009; Świeczewska, 2009]). After adding variable reflecting the level of technology and transformation of (1) into growth equation, we finally receive:

$$Growth = f_1(Cap\_Gr, Lab\_GR, TC).\tag{2}$$

Arguments of function f_1 denote growth of capital, growth of labour force and technological change respectively.

However we should take into account the fact that the level of GDP is a sum of its components:

$$Y = C + I + G + Exp - Imp,\tag{3}$$

where C, I, G, Exp, Imp denote consumption, investment, government spending, export and import respectively. If we transform (3) into growth equation and include factors shaping growth from equation (2) we finally receive:

$$Growth = f_2(Cap\_Gr, Lab\_GR, TC, Con\_Gr, Inw\_Gr, G\_Gr, Exp\_Gr, Imp\_Gr),\tag{4}$$

where *Con_Gr, Inw_Gr, G_Gr, Exp_Gr, Imp_Gr* denote respectively consumption growth, investment growth, government spending growth, export growth and import growth.

In order to verify the impact of banking credit on GDP growth we should also include variable denoting the percentage of credit in GDP. In papers re-examining the relationship between financial depth and economic growth it is assumed that below certain level the size of the financial system has a positive impact on the economic growth, however at high levels of financial depth, an increase in the size of the financial system translates to slower growth (see e.g. [Arcand et al., 2012]). Therefore, in the specification growth rate depends on the

level and square of financial depth, which enables estimation of the optimal point of financial depth maximizing economic growth. In order to verify whether the relationship between financial depth and growth has an U-inverted shape, we consider the estimation of the parameters of the following model:

$$Growth_t = \alpha_0 + \alpha_1 PC_t + \alpha_2 PC_t^2 + \mathbf{x}_t \boldsymbol{\beta} + \varepsilon_t, \qquad (5)$$

where PC_t denotes the level of financial depth (measured by the ratio of banking credit to GDP) and $\mathbf{x}_t$ is the set of other explanatory variables. It should be stressed that we are not interested in measuring impact of remaining variables, however we should estimate parameters using possibly wide specification in order to avoid omitted variables bias. $\mathbf{x}_t$ should consist of variables, which are included in specification (4) and turn out to have statistically significant impact on economic growth. We are aware that growth regressions very often include many sophisticated variables (see e.g. [Moral-Benito, 2010; Cicone, Jarocinski, 2008]), however we have limited sample of data and we are not interested in finding impact of them. Therefore we include in vector $\mathbf{x}_t$ only the most important variables, which are especially important according to economic theories. Hypothesis about the U-inverted shape of the relationship between economic growth and financial depth is as follows:

$$H_0 : \alpha_1 = \alpha_2 = 0, \qquad (6)$$
$$H_1 : \alpha_1 > 0 \quad \wedge \quad \alpha_2 < 0.$$

If the estimates of the parameters of model (5) are found and H_0 hypothesis is rejected, then the optimal level of financial depth is calculated as follows:

$$Opt\_PC = -\frac{\hat{\alpha}_1}{2\hat{\alpha}_2}. \qquad (7)$$

2.2. Data and empirical approach

Parameters of model (5) are estimated for the Polish economy. We use quarterly data covering period from 2000Q1 to 2015Q2. Since the estimation is based on growth variables and we use growth between analogous quarters of neighbouring years, our sample covers the period 2001Q1-2015Q2. In order to take into account an impact of the situation in global economy on the economic growth in Poland, we add period dummy variables, which reflect deterioration in growth in specific period. Variable *U2008Q2_2009Q3* takes on value 1 in the

first phase of the global financial crisis and variable *U2012Q4_2013Q1* reflects very slow growth in polish economy in turn of years 2012 and 2013. We also consider variable associated with the growth rate in the main Polish trading partner (Germany). In addition we measure an impact of the euro area sovereign debt crisis (we are aware that slowdown in Germany was not so intensive as in Greece, Spain and other crisis-affected countries). In order to reflect the presence of the labour variable in the neoclassical production function, we included the unemployment rate (variable U_t) in our specification. We also included period dummies, when we observed relatively large (in absolute value) residuals. Next problem, which we face during the estimation may be associated with endogeneity of some variables. In fact slow GDP growth leads to increase in unemployment rate. Therefore in the case of this variable we take one-year lag instead of current value. Table 1 presents the results of the estimation of parameters and specification testing:

Table 1. Results of the estimation of the parameters of the growth equation

Variable	Estimate	Measuring goodness of fit and specification tests	
Cons	-0.319***	Goodness of fit	R-squared = 0.9 Adjusted R-squared = 0.87
Germany_Gr$_t$	0.001*	Testing hypothesis (6) using Wald test	Statistic = 14.52 p-value = 0.00
PC$_t$	**1.680***	Portmanteau test for autocorrelation	Statistic = 0.68 p-value = 0.72
(PC^2)$_t$	**-1.957***	Cointegration Dickey-Fuller test for stationarity of residuals	Statistic = -6.82 p-value = 0.00
U$_{t-4}$	-0.062*		
Cap_Gr$_t$	0.135***		
TC	0.002*		
Exp_Gr$_t$	0.066***		
U2008Q2_2009Q3$_t$	-0.014**		
U2012Q4_2013Q1$_t$	-0.013**		

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

It can be noticed that estimates of parameters have appropriate signs, which are in line with economic theory. We reject H$_0$ hypothesis that $\alpha_1 = \alpha_2 = 0$, we do not have the problem of autocorrelation and residuals are stationary. On the basis of the results presented in table 1, we calculate optimal value of the financial depth:

$$Opt\_PC = -\frac{\hat{\alpha}_1}{2\hat{\alpha}_2} = 0.43 \,. \tag{8}$$

It means that 0.43 is the optimal level of financial depth in the case of Polish economy. If the financial depth is below this level then it has positive impact on the economic growth. Above this level, financial system in Poland seems to be "too large" compared to the size of the domestic economy. Above this line the financial development hits negative social returns.

Our results are consistent with the results of other authors [Arcand, Berkes, Panizza, 2012] that there is a limit beyond which, as a result of a further increase in the level of lending in the economy appears "vanishing effect" of the impact on GDP growth, and then increase the share of bank credit/GDP may cause negative GDP growth, *ceteris paribus*.

In order to check robustness of the results, we verified whether calculation of optimal point was sensitive to shortening sample. Fig. 1 shows how optimal point evaluated when we were shortening our sample by deleting one quarter.
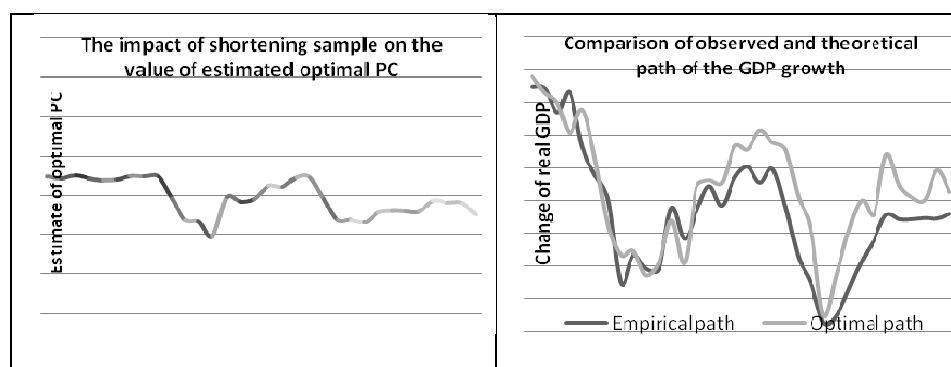

Fig. 1. Performance of the optimal point in shortened sample (left window). Counterfactual forecast of the GDP growth rate for Polish economy if the financial depth had been at optimal level (right window)

According to fig. 1, we can notice that shortening sample does not affect calculations of the optimal financial depth level. Even if we consider sample 2008-2015 covering the period of the global financial crisis, then estimated optimal value of the financial depth is not far from 0.43. This results informs about stability and credibility of our results. We can infer that estimation of the parameters in subsamples is not justified.

3. Counterfactual forecasts of the GDP growth for different levels of financial depth

In order to check how the rate of growth of GDP would have fluctuated if the ratio of banking credit to GDP had been at the optimal level, we calculated theoretical value of GDP growth (assuming financial depth at the level of 0.43). Fig. 1 also shows empirical path of the GDP growth and theoretical one from the beginning of 2007 to the end of sample. The choice of the lower bound for our simulations results from the fact that from year 2007 we see substantial increase of the credit to GDP ratio for the polish economy.

According to the foregoing graph, in the periods of gaining momentum difference between optimal path and empirical path is especially large. In the first quarter of 2014, the rate of growth of real GDP would have been higher by almost 2 percentage points if financial depth had been at the level of 0.43. In this period financial depth was above 0.53. A large increase of credit to GDP ratio was observed in times, when polish economy was gaining momentum.

Conclusions

Services of the financial sector is one of the most important catalysts of economic growth. Thanks to these services in the economy there is effective allocation of savings from investments having relatively lower income towards investment with a higher rate of return, at the lowest possible transaction costs and an acceptable level of risk. The study main focus was on the analysis of one of the elements characteristic and strongly interacting in recent decades, the participation of credit intermediation in promoting economic growth. The ongoing process of deleveraging and changes in the financing structure of the banking sector adversely affect credit growth and domestic demand. The importance of this factor increases that Europe's banking sector plays an important role in raising funds for investment by businesses than in the United States, where it remains the dominant source of funding for the capital market.

The optimal level of financial depth in the case of Polish economy is 0.43. If the financial depth is below this level then it has positive impact on the economic growth. Above this level, financial system in Poland seems to be "too large" compared to the size of the domestic economy. Above this line the financial development hits negative social returns. Our results are consistent with the results of other authors [Arcand, Berkes, Panizza, 2012] that there is a limit beyond which, as a result of a further increase in the level of lending in the economy appears "vanishing effect" of the impact on GDP growth.

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OPTYMALIZACJA POZIOMU KREDYTU BANKOWEGO WE WSPIERANIU WZROSTU GOSPODARCZEGO. IMPLIKACJE DLA POLSKI

Streszczenie: Usługi sektora finansowego są jednym z najważniejszych katalizatorów wzrostu gospodarczego. Główna uwaga jest zwrócona w kierunku próby optymalizacji relacji kredytu bankowego do PKB w polskiej gospodarce. Globalny Kryzys Finansowy ponownie ukazał pewne nieprawidłowości w funkcjonowaniu i rozwoju sektora finansowego i jego „przecenionego" oddziaływania na wzrost gospodarczy. Na podstawie przeprowadzonych badań stwierdzono, iż optymalny poziom udziału kredytów bankowych w stosunku do PKB za lata 2000-2015 wynosi 43%. Poniżej tego poziomu poten-

cjał wzrostowy gospodarki nie jest w pełni wykorzystywany. Jeśli analizowana relacja przekracza 0.43, to wówczas nadmierne zadłużenie gospodarstw domowych i konieczność płacenia wysokich rat hamuje popyt wewnętrzny i prowadzi do niższej stopy wzrostu PKB.

Słowa kluczowe: rozwój finansowy, wzrost gospodarczy, kredyt bankowy, model wzrostu gospodarczego.