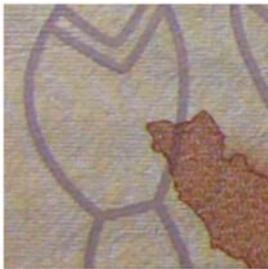
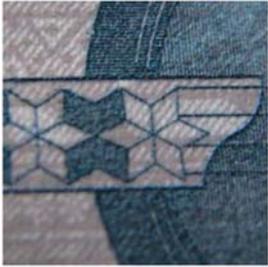




CENTRAL BANK OF  
THE REPUBLIC OF AZERBAIJAN

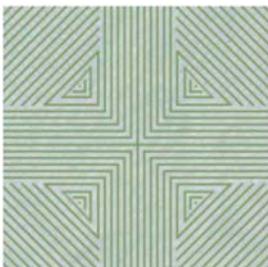
WORKING PAPER SERIES  
№ 02/2015



FINANCIAL INTERMEDIATION AND ECONOMIC GROWTH



*L.YUSIFZADA,  
A.MAMMADOVA*



---

Note: The views expressed in this working paper are those of the author(s) and do not necessarily represent the official views of the Central Bank of the Republic of Azerbaijan.

---

**Abstract:** Financial depth does not fully reflect how well the financial intermediaries serve to economic agents in stimulating economic growth. Additional aspects of financial system such as access, efficiency and stability should be taken into account in order to shed light into the relationship between finance and economic growth. In our paper we capture the four aspects of finance – depth, access, efficiency and stability – to investigate the impact of financial development and economic growth. Our results suggest that the impact of four parameters of financial development differs depending on the level of financial development and has an inverted S-shape function.

**Keywords:** Financial intermediaries, financial development, economic growth, financial depth, access to finance, efficiency, financial stability

**JEL Classification:** E44, O16

## **Introduction**

The role of financial intermediation in economic growth has been widely recognized in theoretical and empirical research. Finance can stimulate the main drivers of growth such as capital and total factor productivity. Financial intermediaries decrease transaction costs of capital accumulation and encourage savings. Financial intermediaries are also essential in increasing total factor productivity by directing investments to the most productive projects and monitoring them in a cost efficient way.

Most of research papers that investigate the relationship between finance and growth mainly concentrate on the financial depth indicators. However, both experience and research prove that financial depth does not fully reflect how well the financial

intermediaries serve to economic agents in stimulating the productivity and capital accumulation. Additional aspects of financial system such as access, efficiency and stability should be taken into account in order to shed light into the relationship between finance and economic growth.

In our paper we capture the four aspects of finance – depth, access, efficiency and stability – to investigate the impact of financial development and economic growth. We use Cihak et al.'s (2012) approach for characterization of financial system using several indicators of depth, access, efficiency and stability. We construct indices to measure these four aspects of the financial system for a sample 118 countries and 8 years from 2004 to 2011. Then we use the indices to assess the relationship between finance and growth by running dynamic panel GMM regressions. Our approach also allows us to capture non-linearity of finance-growth relationship by adding squared form the indices to the regressions.

The results suggest that the impact of four parameters of financial development differs depending on the level of financial development. Thus, relationship between economic development and finance is not linear. We conclude that the relationship between finance and growth can be best explained by Favara's (2003) inverted S shape function.

The paper is organized as follows: The second chapter reviews the literature on the role of finance in economic growth. In chapter three we analyze financial depth, access to finance, efficiency and stability indicators, as well as the indices constructed from these indicators in three groups of developed, developing and emerging countries. Next chapter introduces the methodology. The fifth chapter presents the results and conclusions are discussed in the final chapter.

## **Literature review**

Early theoretical discussions of the relationship between financial development and economic growth, by Bagehot (1873) and Schumpeter (1912) recognized the role of financial intermediaries in allocation of resources to the most effective producers (Levine, 1997). Later in the 60s-70s Goldsmith (1969), McKinnon (1973), Shaw (1973) emphasized those financial restrictions such as interest rate limits, and reserve requirements may jeopardize financial sector development and economic growth. However, it was as late as the 1980s when the importance of financial intermediaries' monitoring and screening functions for economic growth were widely recognized to be one the conditions for economic growth (Bernanke, 1980; Diamond, 1984; Bernanke and Gertler 1988, 1989). In later years substantial body of research has been accumulated to support the view that financial intermediaries have a positive impact on economic growth (King & Levine, 1993; Obstfeld, 1994; Bencivenga et al., 1995; Greenwood & Smith, 1997; Levine, 1997; Levine & Demirgüç-Kunt, 2008).

Pagano (1993) explains three channels through which financial development may affect the economic performance. First of all, financial intermediaries improve efficiency of investments. Second, efficient financial systems decrease transaction costs and as a result increase savings. Third, financial sector development may increase or decrease savings.

Along with the screening and monitoring the most productive investments, financial intermediaries increase productivity through risk sharing and risk minimization. Saint-Paul (1992) notes that improvement in productivity can occur as a result of specialization of producers, however this specialization bears some risk. Developed financial intermediaries mitigate risks by diversifying and sharing these risks between investors. In contrast, it is too risky for producers and investors in countries with

inefficient financial markets to increase productivity by specialization. Benhabib and Spiegel (2000) also confirm the hypothesis that financial intermediaries support the economic growth by increasing total factor productivity.

Moreover, King and Levine (1993) argue that in addition to increasing efficiency, financial intermediaries also propel economic growth through capital accumulation. Development of financial services networks, financial markets, and instruments are necessary for transformation of savings to investments for economic growth (Montiel, 1995). However, Beck (2000) finds evidence that financial sector affects the economic growth through productivity rather than capital accumulation. Financial impact conduit for economic growth may also differ depending on the level of economic development of countries. Industrialized countries might be more sensitive to productivity path, whereas capital accumulation is more important for developing countries (Rioja & Valey, 2004).

Futhermore, results of empirical research also support the proposition that cost efficient financial intermediaries are capable of fuelling the economic growth (Hasan, Koetter, Lensink, & Meesters, 2008; Hasan, Koettler & Wedow, 2009). This proposition implies that financial intermediaries can drive economic growth if they decrease the transaction costs.

It should be mentioned that the impact of financial development on economic growth proved to be positive regardless of the bank or markets dominated structure of the system (Michael, 2001; Levine, 2002). In addition, transmission of financial development to economic growth is conditioned on protection of investors' rights and contract enforcement (Levine, 1997, 2002). Protection of investors' rights and contract enforcement in their turn are determined by legal origin (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997, 1998).

Although there is wide agreement on positive impact of financial development, the positive relationship may reverse after financial system reaches some threshold level. Santomero and Seater's (1999) theoretical model proves that optimal size of financial system exist and it depends on the level of development of production and monitoring technologies, rather than economic cycles. The threshold size of financial sector above which the relationship between finance and economic growth becomes negative is estimated to be 80-100% of GDP (Arcand, Berkes, & Panizza, 2012; Cecchetti & Kharroubi, 2012). The negative impact of excessively large financial sector is associated with existence of too big to fail banks (Laeven, Ratnovski, & Tong, 2014). However, Werkhoven and Schoemaker (2012) argues that presence of multinational corporations might substantiate the existence of large banks.

Favara (2003) suggests an inverted S-shape function, whereas Shen and Lee (2006) propose inverted U-shape function to describe the non-linearity of the relationship between finance and economic growth. It follows that finance - economic growth relationship is not linear.

The impact of financial development on economic growth is not homogeneous across countries, regions and income levels. Country case studies for China (Shan & Jianhong, 2006), India (Ray, 2013), Greece (Adamopoulos & Dritsakis, 2000) and Nigeria (Odeniran & Udejaja, 2010) find evidence in favor for positive relationship between finance and growth. On the other hand, in Turkey the impact of financial development was negative due to the distortion in the structure of the system towards government finance (Pinar & Damar, 2006). Moreover, economies in oil-exporting countries, in Middle Eastern and North African countries, and in low-income countries benefited less from financial development (Riaoja & Valev, 2004; Barajas, Çami, & Yousefi, 2012).

Reviewed literature characterizes financial development mainly by financial sector depth indicators. Beck (2013) summarizes deficiencies of financial depth indicators in three groups: 1) they do not reflect the quality of financial intermediation, 2) they include both household and enterprise lending whereas only enterprise lending has growth boosting quality, 3) they reflect the talent drain from other sectors.

Therefore, measurement of the impact of financial development on economic performance based only on financial depth indicators might not reveal the true relationship. Other aspects of financial system such as access, efficiency and stability can reflect the quality of financial intermediation. In this sense Cihak et al.'s (2012) and World Bank's (2013) approach to describing financial development in four dimensions of depth, access, efficiency and stability may solve the first of the deficiencies mentioned by Beck (2013).

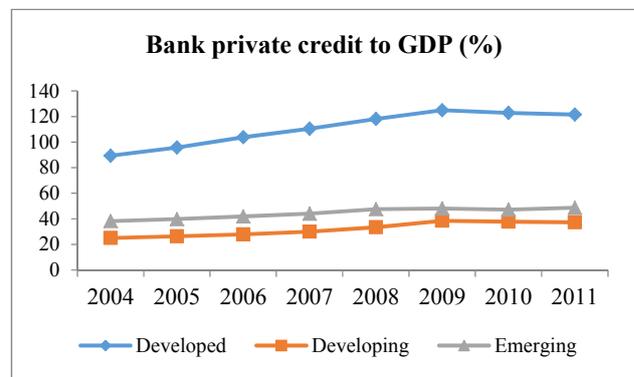
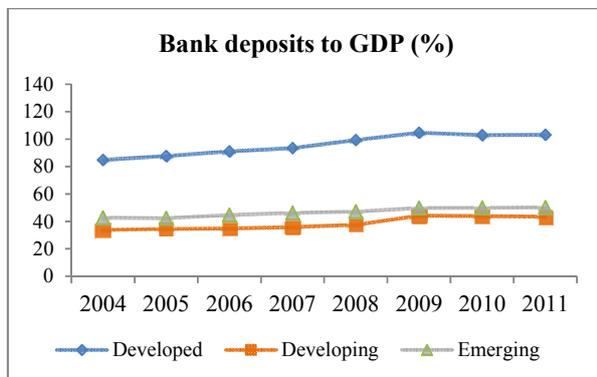
We contribute to the existing literature by using the above mentioned four dimensions of financial development to assess the relationship between finance and economic growth. The magnitudes of depth, access, efficiency, and stability indicators differ substantially depending on the stage of development of countries. Consequently we divide our sample of 118 countries into three groups: developed, developing and emerging. In following chapter we will analyze each of these dimensions.

## **Financial sector development indicators**

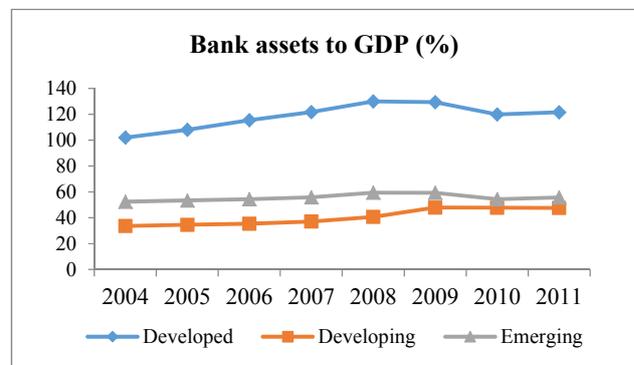
### *Financial depth*

Financial depth is widely used to describe financial sector development. Such indicators as *private sector credit to GDP*, *assets to GDP* and *deposits to GDP* are widely used to measure the financial depth.

**Figure 1. Financial depth indicators**



The graphs show that developed countries are in the leading positions in terms of financial depth. Considerable expansion was observed in all three financial depth variables until 2009. After financial crisis these variables

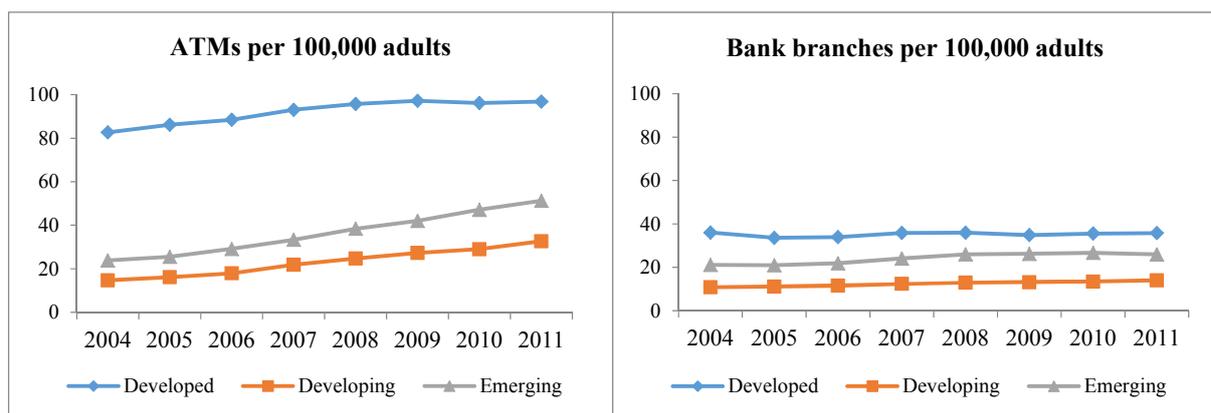


declined slightly. Along with being in leading position according to the level financial depth indicators, developed countries are ahead in terms of growth rates of these indicators. For instance, bank private credit to GDP ratio of developed countries increased 32 percentage points over 8 years between 2004-2011. In developing and emerging countries this number was 12 and 10 percentage point respectively. Similar growth pattern was observed in other financial depth indicators as well: the growth rate of bank deposits to GDP was 18, 10 and 8 percentage points in developed, emerging and developing countries respectively (the growth rate of banking system assets to GDP was 20, 14 and 3 percentage points respectively). As a result the gap between developed and developing countries did not shrink over the 8 years.

## *Access to finance*

Financial sector does not only depend on the size of the financial institutions, but also on the ability of individuals and firms access to financial services. The main advantage of extensive access to financial services is reduction of inequality. Wider access to financial services brings more benefits to lower income people (Beck, Demirguc-Kunt and Levine 2007, Beck, Levine and Levkov 2010). Moreover, financial access stimulates economic development, strengthens competitiveness and demand for labor (World Bank, 2013). Financial access can be measured by branches per 100 000 adults and ATMs per 100000 adults etc.

**Figure 2. Access to finance indicators**



Looking at Figure 2 we observe that developed countries are well positioned with regard to access to finance, whereas developing countries are lagging behind. In contrary to financial depth indicators, access to finance had substantial upward trend in developing and emerging countries with access to ATMs<sup>1</sup> doubling since 2004. The data shows that access to bank branches<sup>2</sup> increased in developing and emerging

<sup>1</sup> In this paper access to ATM means ATMs per 100,000 adults

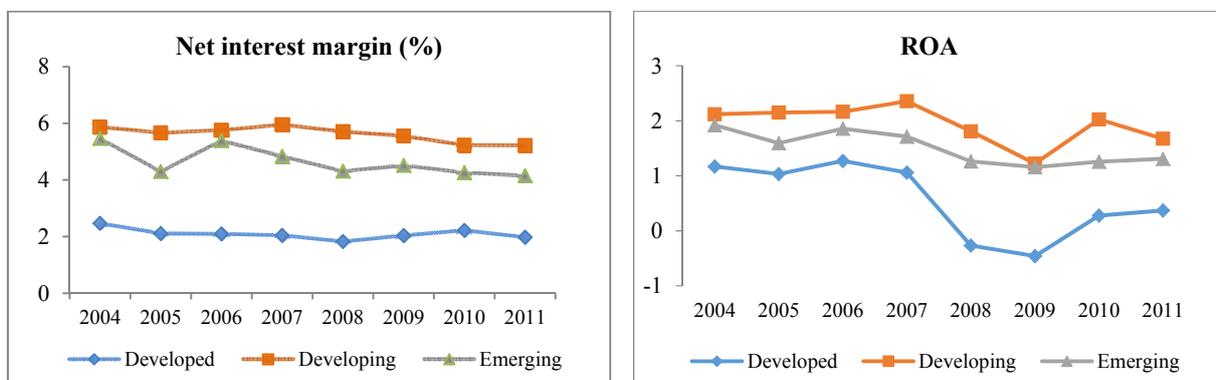
<sup>2</sup> Access to bank branch means bank branch per 100,000 adults

countries by 30% and 23% respectively. Although there has been considerable improvement in access to finance in the emerging and developing countries (rather than developed countries), the gap between developing/emerging countries and developed countries remains substantial. In developed countries, ATM coverage increased by 17%, while access to bank branches fell by 0.7%. Figure 2 implies that substantial progress in access to ATM in all three groups of countries was due to banks rendering their services outside their office buildings, via ATMs since 2004.

### *Efficiency*

It should be mentioned that financial access should be accompanied with high efficiency (for example, reliable payment services, competitive interest rates etc.) in order to deliver expected benefits. Financial institutions should provide their intermediary functions in cost efficient way. *Low net interest margins and ROA reflect the efficiency of financial intermediaries.*

**Figure 3. Efficiency indicators**



On the other hand, excessively low profitability may also indicate inefficiency of financial intermediaries' management or financial stress period. Indeed, substantial decrease in ROA in 2008 and 2009 was result of global financial crises. In other words, net interest margin, ROA and other profitability indicators are expected to be low in efficient financial markets. It means that financial instruments should provide

cost efficient intermediary services in order to add value to production. Figure 3 shows high level of efficiency in developed countries, while developing countries have the least efficient financial intermediaries. Emerging countries stand between developed and developing countries in terms of efficiency.

### *Financial stability*

Financial systems with satisfactory levels of aforementioned three parameters may still lack the ability to support the economic growth because they do not reflect the interconnectedness, volatility, liquidity and other constrains. As recent financial crisis has shown that the deepest and most efficient (in terms of profitability) financial systems have not only failed to support long term sustainable growth but also were one of the main catalysts of the economic crisis. *Financial stability indicators include capital adequacy ratio, liquid assets to deposits, and short term funding.*

**Figure 4. Financial stability indicators**

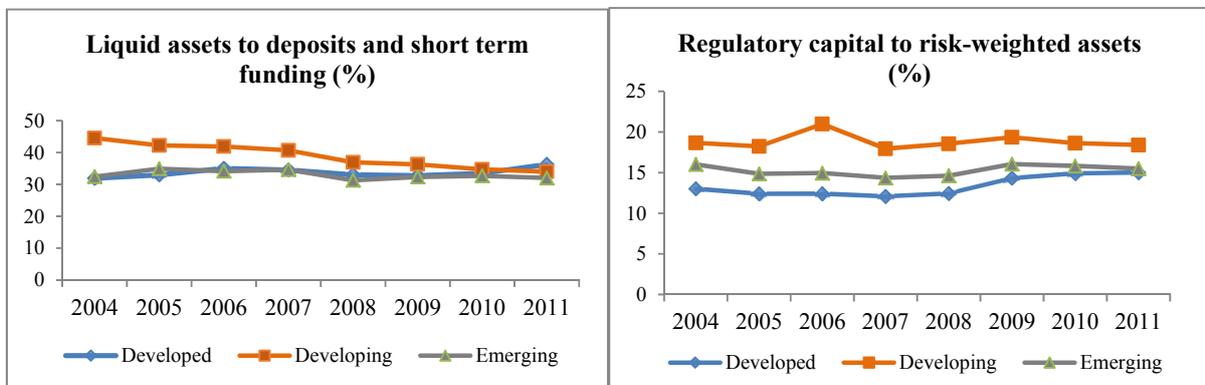


Figure 5 shows that countries are similar regarding stability indicators. In developing countries capital adequacy ratio is approximately 2 times higher than required by international standards. As a result of higher risk aversion and more stringent capital requirements after the global financial crisis capital adequacy ratio has been increasing in developed countries since 2008. In developed countries capital adequacy ratio rose

by 2 percentage points, whereas in developing and emerging countries it has dropped by 0.3 and 0.5 percentage points respectively during 2004-2011. Moreover, in contrast to developing and emerging countries, developed countries have had higher liquidity due to Central Banks' quantitative easing (QE) and low interest rates policy aftermath the financial crises. In addition, banks in developed countries preferred to hold liquid assets rather than lending because of unfavorable economic conditions.

Summarizing the four groups of financial development indicators, we can say that developed countries are ahead in terms of depth, access and efficiency. Furthermore, higher capital adequacy and liquidity indicators in developing and emerging countries might not only ensure financial stability but also be a sign of asset underutilization. On one hand as global financial crisis has shown financial stability is essential for sustainable economic growth, on the other hand capital accumulation and liquidity hoarding which improves financial stability may hinder the economic growth.

It should be mentioned that each of the four financial development parameters should be developed in tandem for financial intermediation to support the economic growth. As Table 1 shows, financial depth and financial access indicators have positive correlation, while these indicators are negatively correlated with efficiency and stability indicators. It means that, financial development strategies should not focus only on one parameter of financial system as growth of access and depth, as well as improvements in efficiency may damage the stability. The case of India can be a classic example where government's financial inclusion program in 1970-ies failed as bank profitability was sacrificed in favor of financial access and as a result lead to foreclosure of rural branches.

**Table 1. Correlation between indicators**

|                           | <i>ATM</i> | <i>Bank branch</i> | <i>Credit to GDP</i> | <i>Deposit to GDP</i> | <i>Asset to GDP</i> | <i>Capital adequacy</i> | <i>Liquid liabilities</i> | <i>Interest margin</i> | <i>ROA</i> |
|---------------------------|------------|--------------------|----------------------|-----------------------|---------------------|-------------------------|---------------------------|------------------------|------------|
| <i>ATM</i>                | 1          |                    |                      |                       |                     |                         |                           |                        |            |
| <i>Bank branch</i>        | 0.51       | 1                  |                      |                       |                     |                         |                           |                        |            |
| <i>Credit to GDP</i>      | 0.49       | 0.60               | 1                    |                       |                     |                         |                           |                        |            |
| <i>Deposit to GDP</i>     | 0.64       | 0.65               | 0.72                 | 1                     |                     |                         |                           |                        |            |
| <i>Asset to GDP</i>       | 0.63       | 0.65               | 0.78                 | 0.96                  | 1                   |                         |                           |                        |            |
| <i>Capital adequacy</i>   | -0.34      | -0.22              | -0.17                | -0.34                 | -0.31               | 1                       |                           |                        |            |
| <i>Liquid liabilities</i> | -0.19      | -0.08              | 0.00                 | -0.11                 | -0.11               | 0.60                    | 1                         |                        |            |
| <i>Interest margin</i>    | -0.53      | -0.45              | -0.57                | -0.69                 | -0.69               | 0.40                    | 0.06                      | 1                      |            |
| <i>ROA</i>                | -0.28      | -0.41              | -0.25                | -0.47                 | -0.46               | 0.26                    | 0.05                      | 0.39                   | 1          |

## Financial sector development index

In the next step we incorporate all the information of above mentioned indicators and estimate four indices for financial depth, access to finance, efficiency and stability. The calculation of the indices is based on “Principal Component Analysis” (PCA) of 118 country sample (Appendix 1). Indices are constructed for each year between 2004 -2011.

**Table 2. Inputs for financial sector development indices**

|                              |                              |
|------------------------------|------------------------------|
| <b>Financial depth index</b> | Private sector credit to GDP |
|                              | Assets to GDP                |
|                              | Deposits to GDP              |
| <b>Access index</b>          | Branches per 100 000 adults  |
|                              | ATMs per 100 000 adults      |
| <b>Efficiency index</b>      | Net interest margin          |
|                              | Return on assets (ROA)       |
| <b>Stability index</b>       | Capital adequacy ratios      |
|                              | Z-score                      |

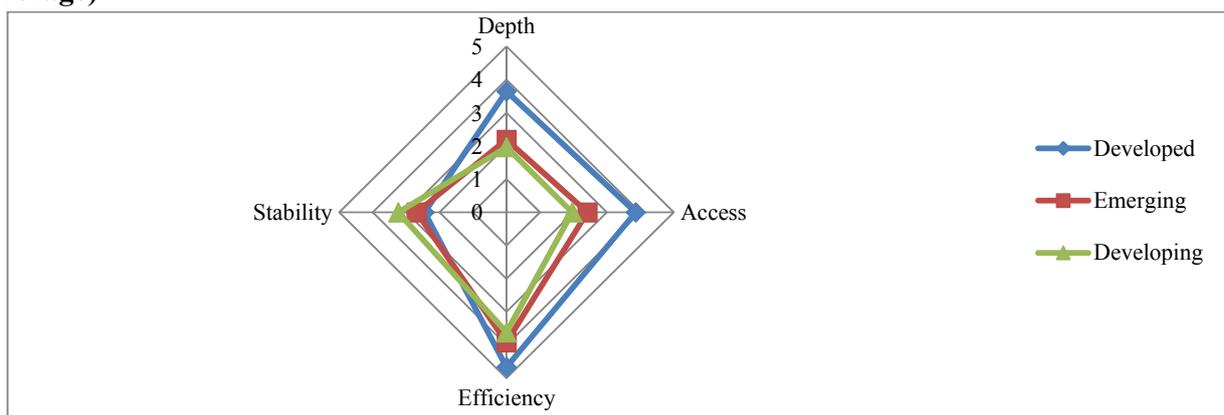
We normalize financial depth, access to finance and stability indices to a one-to-seven scale<sup>1</sup>, with one indicating the worst and seven the best outcome. Because a higher

<sup>1</sup> Formula for normalization of depth, access and stability indices:  $6 * (\text{country score} - \text{sample minimum}) / (\text{sample maximum} - \text{sample minimum}) + 1$

values of efficiency indicators corresponds to worse outcome we use the transformation formula<sup>1</sup> to ensure that the worst and the best outcomes correspond to one and seven respectively (World Economic Forum, 2014).

Indices show clear differences across developed and developing countries as well as emerging economies. Developed countries are ahead in financial depth, access to finance and efficiency, while their stability index is low. In contrast, developing countries have highest values of stability index whereas depth, access and efficiency indices are poor. The four indices for emerging countries stand between the developed and developing countries (figure 5).

**Figure 5. Financial sector development indexes comparison in country groups (2004-2011 average)**



## Methodology

The literature considering relationship between finance and growth mainly uses financial depth indicators such as deposits to GDP, loans to GDP, gross national savings to GDP, monetary aggregates to GDP and market capitalization to GDP ratios as the main indicators of financial development. Economic performance indicators that are considered to be influenced by financial development are GDP, per capita GDP,

<sup>1</sup> Formula for normalization of efficiency index:  $-6 * (\text{country score} - \text{sample minimum}) / (\text{sample maximum} - \text{sample minimum}) + 7$

GDP growth rate, investments, and population growth rate. Researchers mainly use Granger causality, Vector auto regression (VAR), OLS, instrumental variables and generalized method-of-moments (GMM) methodologies to measure the relationship between these two groups of indicators.

The model contains a lagged dependent variable and a set of explanatory regressors  $x$ :

$$y_{i,t} = \alpha y_{i,t-1} + x_{i,t}\beta + u_{i,t} \quad i = 1, \dots, N, \quad t = 1, \dots, T$$

$y_{i,t}$  is real per capita GDP in country  $i$  at time  $t$ .

$x_{i,t}$  represents explanatory variables, including indexes characterizing four parameters of financial system and other control variables. We use financial depth, access to finance, efficiency and financial stability indices presented in the previous section as financial system variables and government final consumption expenditure to GDP, trade to GDP, lagged real per capita GDP growth and average duration of secondary education as control variables.

$u_{i,t}$  is error component<sup>1</sup>.

$$u_{i,t} = \mu_i + v_{it}$$

$\mu_i$  is unobservable individual-specific effect and  $v_{it}$  denotes the remaining disturbance.

Problems such as causality in both directions (Greenwood and Jovanovic, 1990), autocorrelation due to a lagged dependent variable, and difference between time (short) and country (larger) dimensions in the dataset complicate the estimation of links between economic growth and financial development. OLS estimation in this case turns to be biased and inconsistent. GMM is one of the most appropriate model to overcome these problems. Instruments solve the causality problem and lagged explanatory variables can be used as instruments. Anderson and Hsiao (1981)

---

<sup>1</sup> Also our regression includes time dummy (2009)

suggested applying an instrumental variable (IV) estimator using  $y_{i,t-2}$  or  $\Delta y_{i,t-2}$  as instruments for  $\Delta y_{i,t-1}$ .

Arellano and Bond (1991) develop a two-step difference GMM. The first difference transformation removes both the constant term and the individual effect.

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + (x'_{i,1} - x'_{i,2})\beta + (v_{i,t} - v_{i,t-1})$$

$u_{i,t} = \Delta v_{i,t} = v_{i,t} - v_{i,t-1}$  and  $\mu_i$  drops out. In this case  $y_{i,t-2}$  is a valid instrument because it is not correlated with  $\Delta v_{i,t}$ . This estimator is based on the following two moment conditions:

$$E[y_{i,t-s}(v_{i,t} - v_{i,t-1})] = 0, \text{ for } s \geq 2; t = 3, \dots, 12$$

$$E[x_{i,t-s}(v_{i,t} - v_{i,t-1})] = 0, \text{ for } s \geq 2; t = 3, \dots, 12$$

The main problem in this estimator is elimination of the cross-country effect by differencing. To overcome these problems, Blundell and Bond (1998) developed the system GMM estimator. They added two additional conditions:

$$E[(y_{i,t-s} - y_{i,t-s-1})(\mu_i + v_{i,t})] = 0, \text{ for } s = 1;$$

$$E[(x_{i,t-s} - x_{i,t-s-1})(\mu_i + v_{i,t})] = 0, \text{ for } s = 1$$

There is also assumption that the instruments are valid and the error term has no serial correlation. The efficiency of instrument can be checked using 2 tests: J-test and 2-nd difference serial correlation. Null hypothesis for J-test is that instruments are efficient, and for 2-nd difference serial correlation the null hypothesis is that the error terms are not serially correlated.

## Results

We estimate the relationship between financial development and economic growth with panel data covering 118 countries and the period from 2004 to 2011. We split the sample of 118 countries into 3 country groups of developed, emerging and developing countries using IMF's country classification<sup>1</sup>. Complete list of countries is presented in the table 4 of the appendix. The main data source is World Bank's database (for more detailed information on data sources look at table 2 in Appendix). In addition to the lag of the explanatory variables we use legal origin, which is widely recognized as exogenous factor for financial development (Levine, 1997, 2002), as instrumental variable.

**Table 3. Financial depth and economic growth**

Dependent variable: Real per capita GDP growth

| Explanatory variables:                 | Developed countries | Emerging countries | Developing countries |
|--|---------------------|--------------------|----------------------|
| Depth                                  | -0.072***           | 0.119*             | -0.149***            |
| Depth*Depth                            | 0.008***            | -0.021*            | 0.023***             |
| Real GDP per capita (-1) <sup>a</sup>  | 0.656***            | 0.932***           | 0.886***             |
| Government expenditure <sup>b</sup>    | -0.008***           | -0.014***          | -0.0009***           |
| Trade <sup>c</sup>                     | 0.0006***           | 0.0002*            | 0.0001**             |
| Secondary education <sup>d</sup>       | 0.026***            | 0.057***           | -0.103*              |
| Dummy 2009                             | -0.041***           | -0.049***          | -0.035***            |
| <i>Prob (J-statistics)<sup>e</sup></i> | 0.22                | 0.20               | 0.47                 |
| <i>AR (2)<sup>f</sup></i>              | 0.96                | 0.99               | 0.96                 |

<sup>a</sup> This variable is included in log form

<sup>b</sup> General government final consumption expenditure measured as a share of GDP

<sup>c</sup> Trade is the sum of exports and imports of goods and services measured as a share of GDP

<sup>d</sup> Average duration of secondary education, duration (years) is the number of grades (years) in secondary school.

<sup>e</sup> The null hypothesis is that the instrumental variables are not correlated with the error term (H0=instruments are valid)

<sup>f</sup> The null hypothesis is that the errors have no second-order serial correlation.

---

<sup>1</sup> 35 developed, 20 emerging, and 63 developing countries

As instrumental variables: legal origin, lag of the secondary education, depth, depth<sup>2</sup> and real per capita GDP growth

\*\*\* 1%, \*\* 5%, \* 10% significance level

Table 3 shows the results of dynamic panel GMM estimations. First of all, in line with Favara (2003), Rioja and Valev (2004), Shen and Lee (2006), Cechetti and Kharroubi (2012) our estimations show that relationship between economic development and finance is not linear. According to regression results presented in table 3 economic development-financial depth relationship is significant in developing and developed countries but weakly significant in emerging countries. Financial depth has negative impact in levels and positive impact in squared form in developing and developed countries.

#### **Table 4. Access to finance and economic growth**

Dependent variable: Real per capita GDP growth

| <b>Explanatory variables</b>           | <b>Developed countries</b> | <b>Emerging countries</b> | <b>Developing countries</b> |
|--|----------------------------|---------------------------|-----------------------------|
| Access                                 | 0.060***                   | 0.068***                  | -0.027***                   |
| Access*Access                          | -0.005***                  | -0.007***                 | 0.003***                    |
| Real GDP per capita (-1)               | 0.610***                   | 0.812***                  | 0.851***                    |
| Government expenditure <sup>b</sup>    | -0.007***                  | -0.001*                   | 0.0008*                     |
| Trade                                  | 0.0005***                  | 0.001***                  | 0.001***                    |
| Secondary education                    | 0.026***                   | -0.031*                   | -0.045***                   |
| Dummy 2009                             | -0.044***                  | -0.042***                 | -0.031***                   |
| <i>Prob (J-statistics)<sup>a</sup></i> | <i>0.24</i>                | <i>0.21</i>               | <i>0.33</i>                 |
| <i>AR (2)<sup>b</sup></i>              | <i>0.98</i>                | <i>0.66</i>               | <i>0.96</i>                 |

<sup>a</sup> The null hypothesis is that the instrumental variables are not correlated with the error term (H0=instruments are valid)

<sup>b</sup> The null hypothesis is that the errors have no second-order serial correlation

As instrumental variables: : legal origin, lag of the secondary education, access<sup>2</sup>, trade, and real per capita GDP growth

\*\*\* 1%, \*\* 5%, \* 10% significance level

Relationship between access to finance and growth is not linear either, as the coefficients change the sign when indexes are raised to the power of two. In emerging and developed countries access is growth promoting up to some threshold level beyond which additional increase in access to finance undermines economic development. In contrast, developing countries have negative relationship between access to finance and economic development up to the threshold and positive relationship beyond. Beyond this threshold an incremental increase in access to finance has a negative impact for economic growth of developing countries. Thus, the relationship between finance and growth can be best explained by Favara's (2003) inverted S shape function. According to inverted S shape function the least and the most developed financial systems are having negative impact on economic growth. Financial system is growth promoting when the access to finance is medium.

The negative coefficient for access index for developing countries captures the negative slope. Positive coefficient for squared access index for developing countries and positive coefficient for access index in levels for developed and emerging countries capture positive slope of inverted S function. Finally, the negative coefficient for squared access index for developed and emerging countries captures the negatively sloped tail of the inverted S function. It seems that positive sign for access index in levels is mainly driven by intermediate size of the financial sector.

**Table 5. Efficiency index and economic growth**

Dependent variable: Real per capita GDP growth

| <b>Explanatory variables</b> | <b>Developed countries</b> | <b>Emerging countries</b> | <b>Developing countries</b> |
|------------------------------|----------------------------|---------------------------|-----------------------------|
| Efficiency                   | 0.011***                   | 0.023***                  | 0.007***                    |
| Efficiency*Efficiency        | -0.0007***                 | -0.003***                 | -0.001***                   |
| Real GDP per capita (-1)     | 0.828***                   | 0.965***                  | 0.893***                    |

|  |           |           |           |
|--|-----------|-----------|-----------|
| Government expenditure                 | -0.008*** | -0.009**  | -0.004*** |
| Trade                                  | 0.0006*** | 0.0003*   | 0.0006*** |
| Secondary education                    | 0.076***  | 0.066***  | 0.017***  |
| Dummy 2009                             | -0.033*** | -0.053*** | -0.03***  |
| <i>Prob (J-statistics)<sup>a</sup></i> | 0.48      | 0.20      | 0.42      |
| <i>AR (2)<sup>b</sup></i>              | 0.99      | 0.99      | 0.78      |

<sup>a</sup> The null hypothesis is that the instrumental variables are not correlated with the error term (H0=instruments are valid)

<sup>b</sup> The null hypothesis is that the errors have no second-order serial correlation

As instrumental variables: : legal origin, lag of the secondary education, efficiency, efficiency<sup>2</sup>, and real per capita GDP growth

\*\*\* 1%, \*\* 5%, \* 10% significance level

To sum up, access to finance can stimulate growth in medium range interval, above and below which access to finance is damaging for economic development. The factors that determine the negative slope may differ in developed and developing countries. Application of information technologies to banking services decreases demand for brick and mortar branches in developed countries. At the same time, a rapid and excessive increase of bank branches and ATM networks might deteriorate the profitability of banks and decrease the efficiency in developing countries (e.g. the case of India).

Furthermore, for all three groups of countries coefficients for efficiency in levels are positive and negative in squared form. Efficient financial intermediaries are crucial for economic development. High net interest margin and profitability ratios, which are the inputs for calculation of efficiency index, may indicate limited competition in the financial sector, which in turn, increases the cost of financial intermediation and undermines the positive impact of finance on economic growth (Harrison 1999). In other words, high efficiency index implies lower interest margins and profitability, therefore increases economic growth.

On the other hand, excessively high efficiency will deteriorate banks' profitability. As implied by Santomero and Seater's model (2000), the financial system supports economic growth to the extent that efficiency gains in production are higher than monitoring costs. However, as the financial institutions in search for higher profit margins engage in non-traditional lending activities, rather than channeling funds to real economy, their screening and monitoring function is compromised, thus the economic growth is undermined. Indeed, Beck et al. (2012) demonstrate that only traditional intermediation activities are growth promoting. Negative sign for squared efficiency index may reflect the divergence of financial institutions from their traditional intermediation functions to synthetic financial products which have lost the link with the real economy (Demirguc-Kunt & Huizinga, 2010).

To sum up, higher efficiency may discourage monitoring function of financial intermediaries and lead to economic downturn. As countries reach high efficiency level, further increase in efficiency of financial intermediaries seems ineffective for economic development. Moreover, high efficiency, thus low profitability may cause decline in GDP of financial sector, which is one of the components of total GDP.

**TABLE 6. FINANCIAL STABILITY INDEX AND ECONOMIC GROWTH**

Dependent variable: Real per capita GDP growth

|                                       | Developed countries | Emerging countries | Developing countries |
|---------------------------------------|---------------------|--------------------|----------------------|
| Stability                             | -0.021***           | -0.018**           | 0.006***             |
| Stability*Stability                   | 0.002***            | 0.0002**           | -0.001***            |
| Real GDP per capita (-1) <sup>a</sup> | 0.564***            | 0.875***           | 0.893***             |
| Government expenditure <sup>b</sup>   | -0.006***           | -0.021***          | -0.004***            |
| Trade <sup>c</sup>                    | 0.0005***           | -0.0003*           | 0.001***             |
| Secondary education <sup>d</sup>      | -0.0007*            | 0.039***           | 0.043***             |
| Dummy 2009                            | -0.039***           | -0.035***          | -0.027***            |

|  |      |      |      |
|--|------|------|------|
| <i>Prob (J-statistics)<sup>e</sup></i> | 0.30 | 0.43 | 0.33 |
| <i>AR (2)<sup>f</sup></i>              | 0.98 | 0.42 | 0.59 |

<sup>a</sup> The null hypothesis is that the instrumental variables are not correlated with the error term ( $H_0$ =instruments are valid)

<sup>b</sup> The null hypothesis is that the errors have no second-order serial correlation

As instrumental variables: : legal origin, lag of the secondary education, stability, stability<sup>2</sup>, government expenditure and real per capita GDP growth

\*\*\* 1%, \*\* 5%, \* 10% significance level

In addition, economic development appears also to be an inverted S shape function of financial stability. Emerging and developed countries seem to be in a negative slope zone of the inverted S function. Their financial stability index should reach a threshold level in order to have positive impact on economic growth. On the other hand, developing countries have the best performance in financial stability index and the relationship between financial stability and economic development is positive up to some point. However, as negative coefficient for squared stability index suggests, extreme increase in financial stability index will move these countries to the negative sloped tail of the function, in other words will compromise the economic performance in emerging and developed countries.

It means that at low levels of financial stability financial market participants might be too risk averse and hoard liquidity rather than extend loans to real sector. In this case, improvements in financial stability will have negative impact on economic growth. As financial stability reaches some intermediate level it starts to ensure economic development. However, economic development reverses if financial system is excessively stable and financial intermediaries keep more capital and liquidity than what is needed.

## **Conclusion**

Analysis of financial sector development indexes indicate clear differences across developed and developing countries as well as emerging economies. Developed countries are ahead in financial depth, access to finance and efficiency, while their stability index is low. The four indices for emerging countries stand between the developed and developing countries.

Econometric estimations show that relationship between economic development and finance is not linear. Our results suggest that the relationship between finance and growth can be best explained by Favara's (2003) inverted S shape function. According to the inverted S shape function the least and the best developed financial systems are having negative impact on economic growth. Financial system is growth promoting when the size of financial market is medium. Growth of financial sector decreases per capita GDP when financial intermediaries are poorly or excessively developed.

In emerging and developed countries access to finance is growth promoting up to some threshold level beyond which additional increase in access to finance undermines economic development. In contrast, developing countries have negative relationship between access to finance and economic development up to the threshold and positive relationship beyond. Efficiency coefficients in all three groups of countries in levels are positive and negative in a squared form. Higher efficiency may discourage monitoring function of financial intermediaries and lead to economic downturn. As countries reach high efficiency level further increase in efficiency of financial intermediaries seems ineffective for economic development.

At low levels of financial stability financial market participants might be too risk averse and hoard liquidity rather than extend loans to the real sector. In this case, improvements in financial stability will have a negative impact on economic growth.

As financial stability reaches some intermediate level it starts to ensure economic development. However, economic development reverses if financial system is excessively stable and financial intermediaries keep more capital and liquidity than what is needed.

## **Bibliography**

- Adamopoulos, A., & Dritsakis, N. (2000). Financial Development and Economic Growth in Greece: An Empirical Investigation with Granger Causality Analysis. *Working paper*, 1-24.
- Arcand, J. L., Berkes, E., & Panizza, U. (2012, june). Too much finance? *IMF Working Paper, WP/12/161*.
- Ayadi, R., Emrah, A., Sami, B., & Willem, P. G. (2013). Financial Development, Bank Efficiency and Economic Growth across the Mediterranean. *MEDPRO Technical Report No. 30*, 1-15.
- Bagehot, W. (1873). *Lombard Street: A Description of the Money Market* (1962 Edition ed.). Homewood, IL: Richard D. Irwin.
- Baltagi, B. H. (2009). *Econometric Analysis of panel data*. England, Third edition: John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ.
- Barajas, A., Çami, R., & Yousefi, S. R. (2012). The finance and growth nexus re-examined: do all countries benefit equally? *IMF Working Paper, WP/13/130*.
- Beck, L., Levine, R., & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58, 261-300.
- Beck, T. (2013, October 27). *Finance and growth: Too much of good thing?* Retrieved September 5, 2014, from VOX: Research-based policy analysis and commentary from leading economists: [http://www.voxeu.org/article/finance-and-growth?quicktabs\\_tabbed\\_recent\\_articles\\_block=0](http://www.voxeu.org/article/finance-and-growth?quicktabs_tabbed_recent_articles_block=0)
- Beck, T., Degryse, H., & Kneer, C. (2012). Is more finance better? Disentangling intermediation and size effect of financial systems. *Journal of Financial Stability*, 10.
- Benchivenga, V., Smith, B., & Starr, R. (1995). Transactions costs, technological choice, and endogenous growth. *Economic theory*, 67, 153-177.
- Benhabib, J., & Spiegel, M. M. (2001). The Role of Financial Development in Growth and Investment. *Economic Growth*, 5(4), 341-360.
- Bernanke, B. (1980). Nonmonetary effects of the financial crises in the propagation of the great depression. *The American Economic Review*, 73(3), 257-276.

- Bernanke, B., & Gertler, M. (1989). Agency Costs, Net Worth, and Business Fluctuations. *The American Economic Review*, 79(1), 14-31.
- Caporale G. M., R. C. (2009). Financial Development and Economic Growth: Evidence from Ten New EU Members. *Working Paper, No. 09-37*, 1-39.
- Cecchetti, S. G., & Kharroubi, E. (2012). Reassessing the impact of finance on growth. *BIS Working Papers*, 381.
- Cihak, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking Financial Systems around the World. *Policy Research Working Paper 6175*.
- Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *The Review of Economic Studies*, 51(3), 393-414.
- Favara, G. (2003). An empirical reassessment of the relationship between finance and growth. *IMF Working Paper, WP/03/123*.
- Goldsmith, R. (1969). Financial Structure and Development. *The Economic Journal*, 80(318), 365-367.
- Greenwood, J., & Smith, B. (1997). Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics and Control*, 21, 145-181.
- Hasan, I., Koetter, M., & Wedow, M. (2009). Regional growth and finance in Europe: Is there a quality effect of bank efficiency? *Bank of Finland Research Discussion Paper, 13*.
- Hasan, I., Koetter, M., Lensink, R., & Meesters, A. (2008). Bank Efficiency, Financial Depth, and Economic Growth. *Working paper*.
- Hasan, I., Renzis, T. D., & Schmiedel, H. (2013). Retail payments and the real economy. *ECB Working Paper Series*.
- Hurlin, C., & Venet, B. (2008). Financial Development and Growth: A Re-Examination using a Panel Granger Causality Test. 1-30.
- King, R., & Levine, R. (1993). Finance, entrepreneurship, and growth. *Journal of Monetary Economics* 32 (1993) 513-542. North-Holland.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1997). Legal determinants of external finance. *Journal of Finance*, LII(3).
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1113-1151.
- Laeven, L., Ratnovski, L., & Tong, H. (2014). Bank Size and Systemic Risk. *IMF Staff Discussion Note, SDN/14/04*.

- Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature*, XXXV, 688-726.
- Levine, R. (2002). Bank-based or market-based financial systems: which is better? *Working Paper*, 9138.
- Levine, R., & Demirgüç-Kunt, A. (2008). Finance, Financial Sector Policies, and Long-Run Growth. *Policy Research Working Paper*, 4469 .
- Levine, R., Loayza, N., & Beck, T. (1999). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics* 46 (2000) 31 77.
- McKinnon, R. I. (1973). *Money and Capital in Economic Development*. Washington.
- Michael, T. (2001). *Finance and economic growth - review of theory and the available evidence*.
- Montiel, P. J. (1995). Financial policies and economic growth: Theory, evidence and country-specific experience from sub-Saharan Africa. *African Economic Research Consortium, Special Paper No 18*.
- Obstfeld, M. (1994). Risk-Taking, Global Diversification, and Growth. *The American Economic Review*, 84(5), 1310-1329.
- Odeniran, O. S., & Udejaja, A. E. (2010). Financial Sector Development and Economic Growth: Empirical Evidence from Nigeria. *Central Bank of Nigeria Economic and Financial Review*, 91-124.
- Pagano, M. (1993). Financial markets and growth. *European economic review*, 37, 613-622.
- Perera, N., & Paudel, R. (2009). Financial development and economic growth in Sri Lanka. *Sydney Business School - Papers*, 157-164.
- Pinar, A., & Damar, E. (2006). Financial Sector Deepening and Economic Growth. *Working Paper*, 1-17.
- Ray, S. (2013). Does Financial Development Promote Economic Growth in India? *International Journal of Economic Practices and Theories*, 140-151.
- Riaoja, F., & Valev, N. (2004). Does One Size Fit All?: A Reexamination of the Finance and Growth. *Journal of Development Economics*, 429-447.
- Saint-Paul, G. (1992). Technological choice, financial markets and economic development. *European economic Review*.
- Santomero, A. N., & Seater, J. J. (2000). Is there an optimal size for the financial sector? *Journal of Banking and Finance*, 945-965.
- Schumpeter, J. A. (1912). *The theory of economic development THEORY OF ECONOMIC DEVELOPMENT*. Cambridge: Harvard University Press.

Shan, J., & Jianhong, Q. (2006). Does Financial Development 'Lead' Economic Growth? The Case of China. *Annals of Economic and Finance*, 197-216.

Shaw, E. S. (1973). *Financial Deepening in Economic Development*. London.

Shen, C.-H., & Lee, C.-C. (2006). Same Financial Development yet Different Economic Growth-Why? *Money, Credit and Banking*.

Werkhoven, D., & Schoemaker, D. (2012). What is the Appropriate Size of the Banking System? *DSF Policy Paper Series*, 5.

World Bank. (2013). *Global Financial development report: rethinking the role of the state in finance*.

World Economic Forum. (2014). *The Global Competitiveness Index 2014-2015*.