

## **Does Financial Deepening spur the Economic growth? Evidence from Bosnia and Herzegovina**

Mehmed Ganić<sup>1</sup>, Betül Ismić<sup>2</sup>, Sahrudin Sarajčić<sup>3</sup>

This paper focuses on the exploration of the causal link between the degree of financial deepening and economic growth in Bosnia and Herzegovina (B&H) by employing ARDL cointegration estimation methodology. ARDL model gives an indication of how some specified variables affect each other over the period of 2006:Q1-2014:Q3. Our findings did not confirm the statistically significant and positive influence of financial deepening on B&H economic growth as measured by FD2, FD3 (Financial Development Indicator-2, and Financial Development Indicator-3) or this relationship seems to be unclear. Obviously, except for the FD1 (monetization ratio) variable, which was proven to be statistically significant and positive in terms of economic growth, this relationship was questionable for the other two variables. Furthermore, it is interesting to note that the behavior of economic growth was strongly influenced by the quality of the financial sector environment and aid effectiveness over the sample period.

### **1. Introduction**

The establishment of a stable market environment for financial institutions in Bosnia and Herzegovina (B&H) has a fundamental importance in terms of the transition of this country from a centrally planned towards market-oriented economy. In recent years, this transition process has been characterized by a substantial progress in strengthening the resilience of the banking sector and opening a new dimension in terms of improvement of its potential.

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<sup>1</sup> Mehmed Ganić, Assist. Prof. Dr. International University of Sarajevo, Department of Management and Economics, Sarajevo, BIH. [mganic@ius.edu.ba](mailto:mganic@ius.edu.ba)

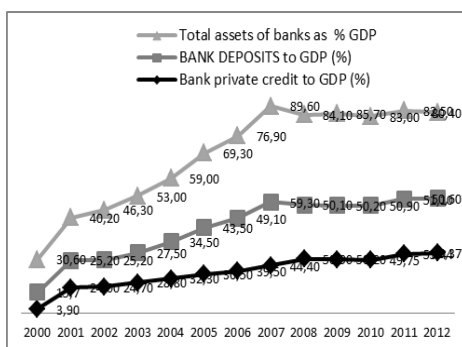
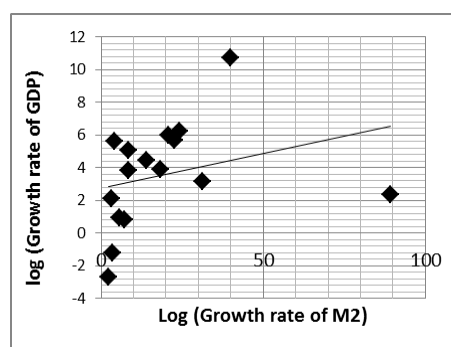
<sup>2</sup> Betül Ismić, Istanbul University, Graduate Student, Department of Econometrics, Istanbul, Turkey. [betulyurd@gmail.com](mailto:betulyurd@gmail.com)

<sup>3</sup> Sahrudin Sarajčić, Assoc. Prof. Dr. University of Sarajevo, School of Economics and Business, Sarajevo, BIH.

In the era of transition, B&H has restructured its financial system and established a new framework of financial markets, in a profound and lasting manner. In its nature, the financial market of B&H is viewed as; shallow and underdeveloped, with a high concentration of the banking sector. As a small country with a small market size, with the poor level of coordination among different government and institution levels, the B&H also has some problems with the existence of well-functioning financial markets. At the same time, infant capital market and its segments, in particular, equity markets and corporate bond markets, generally, have not been developed. The strong credit expansion and credit contraction in B&H in pre-crisis times was the result of financial deepening and restructuring of the financial system.

Moreover, the process of acceleration of financial consolidation was intensified through different tendencies; such as: deregulation, privatization and entry of foreign banks. The process of privatization and sound reforms of the banking sector aimed at overcoming the debt problem. These activities accumulated in the past and resulted in the elimination of the most vulnerable segments of the banking sector. Accordingly, it should be noted that the number of banks was significantly reduced from 1997 (when first post data appeared). A transition to the new era of market oriented commercial banking was marked by the processes of mergers, acquisitions and consolidations of banks, where the number of commercial banks has declined from 76 (in 1997) to 28 banks (in 2012). The analysis of the financial depth (measured as the ratio of M2 to GDP) and financial intermediation (measured as the ratio of private credits to GDP) ratio over a given time period (shown in figure 1) implies some positive trends in the banking industry in B&H.

As shown in the Figure 1, in 2007, the share of commercial banks' activities in financial intermediation was well over 89% of GDP, thus, performing an important function in the financial system of B&H. A further feature of the development of the domestic banking sector is represented in the enhanced role of bank-based financial intermediation. Figure 1 gives an overview of some indicators, as the share of assets, loans and deposits in GDP of B&H.

**Figure 1:** Financial intermediation in B&H**Figure 2:** The relationship between M2 and GDP over the period 2000– 2013

Source: The authors' elaborations on CB of B&H data

As illustrated in Figure 1, financial intermediation, measured by banks' assets to % of GDP, has shown a marked increase from 2000 (e.g. 30.6% of GDP) to 2007 (e.g. 89.6% of GDP). Adverse effects of the global financial crisis translated into reduction of financial intermediation of banks and its slight decline to 80.4% of GDP (2012). During the initial period, the growth of the deposit funding base of banking sector (i.e. as measured as % of bank deposits to GDP) caused the growth of banks' private credits. The total deposits held by banking sector have almost tripled between 2000 and 2007. Meanwhile, by the end of 2012, the share of deposits to GDP reached 50.6 percent, while the share of banks' private credits to GDP reached 56.7 percent. It must be noted that the ratio of private credits to GDP measured at 24% in B&H has crossed the threshold of underdeveloped countries (measured at 20%), in 2001. The share of banks' loans in the total loans to the private sector was slightly above 50%, indicating insufficient development of the financial market. While banks' deposits to GDP ratio reached a historical peak of 59.3 percent (2007) banks' private credit to GDP ratio has also grown positively over time. With the initiation of economic reforms in B&H, since 1998, the growth of broad money M2 was associated with rate higher than the growth rate of GDP (figure 2). Annual growth of M2 in the period 1998 -2013 was moving at an average rate of 18.94%, reflecting the intense process of economy's financial system deepening. In broader sense, this means that an increase in the scope of services of the financial sector were aimed at private sector and household, in parallel with the growth and development of

the economy. All of these changes, compared with the average rate of movement of GDP from 3.56% were the result of the reform's measures, launched in 1997, and its transition to market-oriented economic system. Several reasons have contributed to this growth of the money supply. Firstly, it was the recovery of public confidence in a reformed banking system, which resulted in an inflow of households' savings to commercial banks. The growth rate of deposits, in national and foreign currencies, had a positive impact on the growth of money supply and monetary multiplication of money. The second reason was the influx of money from privatization and foreign direct investment.

In parallel, with the increased value of the monetary aggregate M2 to GDP, the growth of ratio private credit to GDP was recorded. The initial level of banks' credits to the private sector, expressed as a share of GDP in B&H was significantly below average than the one measured in the EU member countries. One of the reasons is the underdevelopment of the domestic financial (banking) system at the beginning of the transition process. The second reason was war and war events in this region that have devastated the domestic banking sector. Expansion of banks' lending started with the low levels of financial intermediation with the aim to "catch up" to the level of financial deepening in advanced transition countries. Therefore, it was expected that the ratio of loans to GDP must grow faster over time.

## **2. Literature Review**

In the last two decades, the question of the possible link between financial deepening and economic growth has been on the forefront of the economic debate. This phenomenon could be viewed in two different ways: Looking at scholars' views into relation financial deepening - economic growth, we can see two schools of thought existing, the first holds that the role of financial factors in economic growth is overemphasized. The second view holds that finance matters for growth. These findings are not unique to the transition countries, but some researchers generally have not found a cause-and-effect relationship between credit to the private sector and economic growth. The main point highlighted was that economic growth in transition countries was not constrained by underdeveloped financial sectors. According to Ferguson (2008) the role of financial deepening in the financing of economic growth was an essential and very necessary factor. There are

many theoretical models which examine and assess the various channels through which finance influences growth. One of the most widely applicable and most easily measurable indicators of financial depth is the ratio of commercial banks' assets to GDP. The same ratio was used by Goldsmith (1969) a prominent figure in the development of a new finance doctrines provided the earliest evidence of causality between financial sector development and economic growth (measured by GDP per capita). In this strand, McKinnon's (1973) work is worth mentioning that financial deepening increases the level of domestic savings rate and reduce borrowing costs and thus encourages investment. Moreover, an increase in interest rates encourages savings with financial intermediaries, and thus, additionally increases the investment funds and contributes to the long-term growth.

In the early 1990s, a number of economists began to analyze, in more detail, the connection between financial deepening and economic growth. The most remarkable study in this field concerned with the contribution to the emerging of understanding of financial deepening and economic growth was the study carried out by King and Levine (1993a; 1993b). They employed a sample cross-country data for 80 countries (from 1960 to 1989) using four variables (the ratio of liquid liabilities to GDP, the ratio of deposit money banks' domestic assets to deposit money banks' domestic assets plus central bank domestic assets, credit issued to private enterprises divided by credit issued to central and local governments plus credit issued to public and private enterprises and credit issued to private enterprises divided by GDP) to examine their effect on economic growth. Their findings provide evidence in favor of the view that there is significant correlation between the aforementioned indicators of financial deepening and economic growth. Furthermore, the level of financial development is a good predictor of future economic growth rates and progress in productivity. In other words, finance does not merely follow economic activity. In coming years, several similar studies were conducted by Calderon and Liu (2002), Christopoulos and Tsionas (2004), Koivu (2002) and Mehl et al. (2005).

Calderon and Liu (2003) used a large sample of 109 countries in the period between 1960 to 1994 to investigate the factors affecting economic growth. From the financial development variables the authors used ratio of broad money (M2) to GDP and the ratio of credit provided

by financial intermediaries to the private sector to GDP. In addition to these variables, for purposes of the model, other specific controlling variables were tested, such as: initial human capital, initial income level, a measure of government size, black market exchange rate premium and regional dummies for Latin America, East Asia and Africa. They clarified the findings by suggesting that financial deepening contributed significantly to economic growth, more in developing countries than industrial countries. Also, Bordo and Rousseau (2006) used M2 to GDP ratio as a proxy variable for financial development, in order to examine its impact on output growth. Explaining their findings, they highlighted that „the longer the period of the sample the larger the effect of financial development on economic growth“. Financial deepening propels economic growth by a more rapid capital accumulation and productivity growth.

At this point it is worth mentioning the study authored by Christopoulos and Tsionas (2004) entitled: „Financial development and economic growth: evidence from panel unit root and cointegration tests, which analyzes 10 developing countries covering the years 1970 to 2000“. The findings of their research did not find a statistically significant short-run causality between financial deepening and GDP.

There are several similar studies conducted in transition countries. Koivu (2002) examined relationship between efficiency and size of the banking sector and economic growth (measured by annual real GDP growth) using panel data for 25 transition countries, over the period between 1993 to 2000. The study could not find a strong relationship between the amount of banks' credit allocated to the private sector and economic growth, while the causality between the growth of credit and real GDP growth remained unclear.

On the other hand, the relationship between financial deepening and growth has recently been summarized in a study conducted by Mehl et al (2005). Their study used panel data set comprised of annual data over the period between 1993 to 2001 for eight Southeast European countries: (Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia (FYR Macedonia) and Serbia and Montenegro, Bulgaria, Romania and Moldova). In an analysis of transition economies, they could not find the evidence that financial deepening positively impacted the economic growth in eight Southeast

European countries. The causality between the development of financial intermediation and economic growth was found to be negative. It was explained by the facts that if a financially environment is unstable, then financial intermediation does not encourage growth and efficiency. Also, the researchers pointed out that the quality of the banking sector may be important for economic growth, rather than financial deepening itself.

Demetriades and Hussein (1996), in reviewing possible relationship between financial development and growth discovered findings similar to those of Mehl et al (2005) by stressing country heterogeneity. By employing panel data analysis on a sample of 16 transition economies, in the period of 27 years, they explored the important determinants (ratio of bank deposit liabilities to nominal GDP and ratio of bank claims on the private sector to nominal GDP) thus affecting the economic growth. The authors clearly stated that the direction of causality between financial development and long-term growth rates among analyzed transition countries was different for each of analyzed countries. But, in a few countries, they found that economic growth caused financial development (Honduras, Spain and Sri Lanka) while findings showed reverse causation in six countries (El Salvador, Greece, Pakistan, Portugal, South Africa, and Turkey), all of which refuted the hypothesis that finance led to growth. Accordingly, it could not be concluded that finance does not cause growth, nor that finance follows growth applicable for each country from a sample. Therefore, they concluded that differences in the development of the financial sector in any country could have arisen by change of institutional characteristics, different policies, as well as differences in their application.

Using cross-country data comprising 34 countries, in the 1950s and 51 countries in the 1960s, Papanek (1973) investigated the aid-growth relationship and the influence a several explanatory variables (foreign aid, foreign investment, other flows and domestic savings as variables) on economic growth. His study revealed that foreign aid as a component of foreign inflows has a more substantially effect on growth than the other variables (savings or other forms of foreign resource inflows) confirming his expectations that aid can fill the foreign exchange gap as well as the savings gap.

Employing cross-sectional data over the period between 1971 to 1990 for seventy seven Developing Countries Fayissa and El-Kaissy (1999) examined aid's growth impact and utilization of foreign aids. They found that foreign aid positively related with the growth of GDP per capita economic growth in most of employed regression's models.

A recent study done by Karras (2006) investigates how foreign aid affects economic growth measured by GDP per capita employing annual data from the 1960 to 1997 for a sample of 71 aid-receiving developing countries. The foreign aid was measured by two variables: total net ODA receipts per capita and total net ODA receipts as a fraction of GDP. Accordingly, their empirical findings revealed that aid-growth relationship is positive, permanent, and statistically significant.

In a recent study, Christopoulos and Tsionas (2004) investigated the long run relationship between financial depth and economic growth combined in a cross-sectional and time series data. They employed panel unit root tests and panel cointegration analysis for 10 developing countries (Ecuador, Jamaica, Colombia, Paraguay, Mexico, Peru, Thailand, Dominican Republic, Honduras, and Kenya). The econometric findings provided support for the view that a long-run causality runs financial depth and output, but there was no evidence of the causal relationship, in both directions. However, the findings did not necessarily have any short-run causality between financial depth and output.



**Table 1:** Summary of the Related Literature

<b>Authors (s) &amp; Year of Study</b>	<b>Major Findings</b>
King and Levine, 1993.b)	Authors found that financial systems stimulate faster productivity growth and growth in per capita output. A large cross-country sample (80 countries) had high values of DEPTH (measured by Ratio of liquid liabilities to GDP), in 1960 grew faster, had higher rates of physical capital accumulation, higher investment rates, and more rapid rates of technological advancement over the 1960-1989 period. Accordingly, the development of the financial system can be positively correlated with future growth due to the fact that the financial system develops in anticipation of future economic growth. Furthermore, it has shown that differences in political systems, legal traditions or institutions can also affect the financial development and economic growth.
Huang and Lin (2009)	Huang and Lin (2009) examined data from study performed by Levine, Loayza and Beck (2000) and employed threshold model with instrumental variables, confirming the positive relationship between financial development and economic growth. According to their findings, this relationship between financial development and economic growth was more pronounced in low-income countries. Also, their study found that in low-income countries financial development does robustly affect capital accumulation and productivity growth.
De Gregorio and Guidotti (1995)	The study found positive correlation between financial indicator (measured by credit to private sector) and growth in more cases but effect of financial deepening is smaller in Latin American countries than in the rest. Moreover, there is additional evidence which points to a long-run negative correlation in a panel data in the case of Latin America. Although, it changes across countries this trends can be explained by effects of extreme liberalization of financial markets followed by their collapse and heterogeneity across countries.
Demetriades and Hussein (1996)	Their study found evidence that finance is a leading sector in the process of economic development employing a sample of 16 countries in the period of 27 years. Also, result of their research showed that the direction of causality between financial development and long-term growth is different for different countries. Furthermore, their study found evidence for some countries that economic growth is the predecessor of financial development.

Odedokun (1996)	A study by Odedokun, covering the period 1960s to 1980s, in the sample of 71 countries found that financial intermediation promotes economic growth in about 85% of countries.
Levine (1998)	He has found statistically significant evidence between development of banking sector and long-term economic growth rates. Furthermore, differences in the legal rights of creditors and the efficiency of the judiciary system explained more than half of the variation in development of the banking sector.
Deida and Fattouh (2002)	Authors employed threshold regression using the data from the study by King and Levine (1993a, 1993.b) and concluded that in low-income countries there was a significant relationship between finance and economic growth, while in high-income countries it was statistically significant and positive.
Calderon and Liu (2002)	The findings of their studies (using a sample of 109 developing and industrial countries from 1960 to 1994) revealed that financial development generally led to economic growth. Financial deepening contributes to causality between financial development and economic growth in the developing countries more than in industrialized countries. Also, in a broader sense they concluded that financial deepening propelled economic growth more rapidly through two channels: capital accumulation and productivity growth, with the latter one is being much stronger.
Christopoulos and Tsionas (2004)	The results obtained in their study found that long-run causality ran from financial development to economic growth, but there was no evidence of bi-directional causality. However, in the short term there was no causality between financial deepening and output.
Rogić and Bogdan (2012)	The authors examined the hypothesis that the development of the financial system in the Republic of Croatia has a positive effect on economic growth. Their study found and confirmed that the three financial indicators ((ratios of private sector credit to total loans, total loans to GDP ratio and the interest rate differential on loans (in national currency) with a currency clause and foreign currency loans)) had a positive impact on economic growth in Croatia.
Cojocar, Hoffman, and Miller, (2011)	These researchers provided evidence that in transition countries the increases in credit to the private sector had a positive effect on the economic growth, but that it can significantly alleviate the inflation rate, high differences between interest rates on loans and deposits and decrease in competitiveness among banks.

*Source: Compiled by the authors.*

### 3. Research Methodology and Data

Of many econometric studies detailed here (section 2) it can be concluded that much less attention has been given to the Western Balkans countries and B&H. Therefore, this paper contributes to the existing literature on financial depth and economic growth, in a way that focuses on the B&H, which in many segments is still lagging behind other neighboring transition countries. Accordingly, the originality of this paper stems from the econometric analysis of the determinants of financial depth and their impact on economic growth in B&H. An econometric analysis is applied to investigate whether there is any statistically significant relationship between independent variables and the economic growth. In order to explore relationship between growth and financial depth we used model based on the endogenous growth model ( $Y = AK_t$ ).

It was extended and followed over the years in numerous studies conducted by King and Levine (1993b), Jalil and Feridun (2011), Khan (2008) and Adu, et.al. (2013). For our needs, the following model will be employed with the explanatory variables that have been proposed in the literature:

$$Y_t = \beta_0 + \beta_1 K_t + \beta_2 FD_t + \beta_3 QFE_t + \beta_4 OPEN_t + \beta_5 DEP_t + \beta_6 AID_t + u_t$$

GROWTH  $\square$   $\square$   $f(K, FD, \text{quality of the financial sector environment, Openness, DEP})$

Our model employs four sets of independent variables: K as a vector of control variable of growth (Gross Capital Formation as % of GDP used as a proxy variable for capital stock), typical variable for measuring financial deepening (Financial Development Indicator-1, Financial Development Indicator-2, and Financial Development Indicator-3) and a variable for measuring foreign aid (AID) are employed to quantify the impact of financial deepening on economic growth, a variable based on deposit interest rate is used to measure financial sector's efficiency, and three variables to measure quality of the financial sector environment (Government Effectiveness, Political Stability, Inflation). The dependent variable in this study includes GDP per capita growth rate, as a proxy for economic growth. Although the rate of economic growth since the end of war in 1995 and the post-war period has been predominantly aid-

driven in the last years the inflow of such a large foreign aid have been declining. The financial assistance was aimed at providing the initial funds for the reconstruction and job creation. In order to test whether the rates of economic growth and fostering development are further supported by foreign aid and transfers supported economy (aid-driven economy), our model is extended by including a variable AID since the B&H has been receiving a large amount of foreign aid. The aim of this study is to explore the impact of financial development on economic growth by employing ARDL co-integration estimation methodology. Quarterly time series data was used for this study covering the period of 2006:Q1-2014:Q3. Data were sourced from the database of Central Bank of B&H, Agency for Statistics of B&H, The World Bank - World Development Indicators (WDI), European Commission Database and The Worldwide Governance Indicators (WGI). The selection of the time period was constrained by the availability of officially published data. The existence of seasonality was tested and time series were seasonally adjusted using moving average method. In time series analysis, if a series does not have a stochastic trend and is stationary, it is said to be integrated of order zero or I(0). If a series has random walk trend, it is said to be integrated of order one or I(1) (Stock & Watson, 2007). The null hypothesis for the non-stationarity is tested. Autoregressive distributed lag model (ARDL) of Pesaran, Shin and Smith (2001) examined the co-integration relationship among variables regardless of the order of integration ((whether they were I(0) or I(1)). ARDL approach allowed for, both, stationary and non-stationary regressors in the model. The equation for ARDL model, is shown, below:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 K_{t-1} + \beta_3 FD_{t-1} + \beta_4 QFE_{t-1} + \beta_5 OPEN_{t-1} + \beta_6 DEP_{t-1} + \beta_7 AID_{t-1} + \sum_{i=1}^m \Psi \Delta Y_{t-i} + \sum_{i=1}^m \theta \Delta K_{t-i} + \sum_{i=1}^m \varphi \Delta FD_{t-i} + \sum_{i=1}^m \eta \Delta QFE_{t-i} + \sum_{i=1}^m \tau \Delta OPEN_{t-i} + \sum_{i=1}^m \xi \Delta DEP_{t-i} + \sum_{i=1}^m \omega \Delta AID_{t-i} + \varepsilon_t$$

Before we apply ARDL model, appropriate number of lags should be determined for the model. Lag lengths can be selected according to Akaike, Schwarz or Hannan-Quinn (AIC, SC, HQ) information criteria. While selecting appropriate lag, the model should not possess any serial correlation.

#### 4. Analysis and Discussion of Results

Before we conduct co-integration analysis, our selected variable should be tested and examined for the stationarity. The results of the Augmented Dickey Fuller and Philips Perron tests for unit root are provided on table 2. The findings reveal that variables FD1, FD2, K, FD3, DEP, PS and GE can be considered as stationary after first differences. Thus, these variables are I(1). GDP, AID, OPEN and INFR variables are observed as stationary, at a level, which means they are I(0).

**Table 2:** Unit root results

<b>LEVEL</b>	<b>ADF</b>	<b>PP</b>
	k=0	k=3
GDP	-9.5826***	-1..3503***
	k=0	k=1
FD1	-2.8282	-2.8224
	k=0	k=3
FD2	-2.6061	-2.4503
	k=8	k=1
FD3	1.3238	-2.0100
	k=0	k=9
K	-2.3053	-2.6087
	k=4	k=0
DEP	-2.2413	-2.0175
	k=4	k=2
OPEN	-3.3873**	-2.7973*
	k=1	k=5
INFR	-5.7009***	-4.3407***
	k=0	k=0
PS	-0.3338	-0.3339
	k=0	k=0
GE	-2.3548	-2.3548
	k= 7	k= 1
AID	-9.5175***	-2.6261*
<b>1ST DIFFERENCES</b>	<b>ADF</b>	<b>PP</b>
	k=0	k=0
FD1	-6.8692***	-6.8692***
	k=0	k=0
FD2	-5.2922***	-5.2923***
	k=7	k=1
FD3	-4.4785***	-4.6244***
	k=1	k=3
K	-4.8366***	-6.9191***
	k=0	k=3
DEP	-5.5301***	-6.6174***
	k=0	k=0
PS	-5.6568***	-5.6568***
	k=0	k=0
GE	-5.5962***	-5.5851***

**Notes:** \*, \*\*, \*\*\* stars refer respectively to 10 %, 5 % and 1 % significance.

**Source:** Authors' calculations, E-views 8

In order to find the best model for our estimation, a model selection criteria, such as: Akaike's information criterion, the Schwarz information criterion and LM Autocorrelation test were employed (table 3). Accordingly, the best-fitting model without serial correlation and minimum information criteria was selected. For LM test, null hypothesis stated that there was no serial correlation in the model. We also provided probability values of LM test, in parenthesis, for easy interpretation. If p value is lower than 0.05, we reject null hypothesis, so there is a serial correlation in the model.

**Table 3:** Lag length selection for ARDL model

	(1)				(2)				(3)		
k*	AIC	SC	LM	k*	AIC	SC	LM	k*	AIC	SC	LM
1	4.42	4.92	4.27 (0.11)	1	4.39	4.89	4.93 (0.08)	1	4.30	4.80	6.55 (0.03)
2	4.18	4.91	2.81 (0.24)	2	4.14	4.87	2.34 (0.31)	2	3.96	4.70	0.62 (0.73)
3	3.79	4.76	12.83 (0.00)	3	4.14	5.11	0.68 (0.70)	3	3.91	4.88	6.39 (0.04)
4	3.39	4.61	29.54 (0.00)	4	3.67	4.88	26.06 (0.00)	4	3.09	4.30	15.95 (0.00)
		(4)				(5)				(6)	
1	4.28	4.77	8.56 (0.01)	1	4.46	4.96	3.34 (0.18)	1	4.49	4.99	5.08 (0.07)
2	3.68	4.42	1.03 (0.59)	2	4.29	5.02	0.39 (0.81)	2	4.28	5.01	0.31 (0.85)
3	3.44	4.41	15.37 (0.00)	3	4.14	5.11	15.30 (0.00)	3	4.38	5.35	9.04 (0.01)
4	2.34	3.55	10.04 (0.00)	4	2.84	4.05	20.32 (0.00)	4	3.34	4.55	21.90 (0.00)
		(7)				(8)				(9)	
1	4.44	4.94	3.21 (0.21)	1	4.46	4.96	1.52 (0.46)	1	4.49	4.99	6.85 (0.03)
2	4.31	5.05	0.92 (0.63)	2	4.35	5.08	2.13 (0.34)	2	4.38	5.11	0.51 (0.77)
3	4.44	5.41	10.34 (0.01)	3	4.24	5.21	8.86 (0.01)	3	4.45	5.42	15.57 (0.00)
4	3.19	4.40	13.46 (0.00)	4	3.74	4.96	28.99 (0.00)	4	3.66	4.88	10.19 (0.00)
		(10)									
1	6.28	6.78	1.98 (0.15)								
2	6.05	6.78	8.82 (0.01)								
3	4.45	5.42	4.91 (0.17)								
4	4.21	5.43	29.16 (0.00)								

**Notes:** "k" represents number of lags in the model. P values are given in parenthesis for LM test.

**Source:** Author's Calculation, E-views 8.

In the light of this information, listed above, lag 2 is selected as our best-fitting model for estimation of first 9 models and lag 3 is the most appropriate for model 10. Optimal lag length for the models was already selected in previous step. Furthermore, the main findings of co-integration test based on ARDL approach are presented in Table 4. F tests are calculated with Wald Test to find a long run relationship among independent variables, while GDP growth represented a dependent variable. Null hypothesis for F test stated no existence of a long run relationship, while an alternative hypothesis stated the existence of co-integration relationship. For two sets of critical values (5% and 10%) from Pesaran (2001), table 3 provides us with lower critical bounds I(0) and upper critical bounds I(1).

If the calculated F statistics is higher than upper critical value, the null hypothesis is rejected. Our evidence showed that there was a co-integration relation between variables. It was shown in table 4 that all nine models have co-integration relation, since F-statistic is greater than the upper critical bounds. The obtained results from table 5 show the estimated Long run equilibrium effects of variables on economic growth. All offered models have good fit and they are well specified. The regressors expressed by R<sup>2</sup> explain between 0.794 and 0.972 variations in economic growth. More specifically, the explanatory power of models, which is measured by the adjusted R<sup>2</sup>, indicates that the regressors in Model 10 explain 95.4 % of variance in the original data and outperform other considered models.

**Table 4:** Wald test results for co-integration

		Critical Values*			
		95 % Bound		90 % Bound	
Models	F-Stat.	I(0)	I(1)	I(0)	I(1)
FY(FD1,FD2, DEP,PS)	6.34	2.86	4.01	2.45	3.52
FY(FD1,FD2, DEP,GE)	6.85	2.86	4.01	2.45	3.52
FY(FD1,FD2,OPEN,GE)	7.65	2.86	4.01	2.45	3.52
FY(FD1,FD2,OPEN,PS)	11.19	2.86	4.01	2.45	3.52
FY(FD1,FD2, K,PS)	5.41	2.86	4.01	2.45	3.52
FY(FD1,K,GE,PS)	6.56	2.86	4.01	2.45	3.52
FY(FD1,FD2,K,GE)	5.35	2.86	4.01	2.45	3.52
FY(FD1,FD2,INFR,PS)	4.77	2.86	4.01	2.45	3.52
FY(FD1,FD3,GE,PS)	5.60	2.86	4.01	2.45	3.52
FY (FD1,FD2,AID,PS)	5.13	2.86	4.01	2.45	3.52

\*Critical values are taken from Pesaran, Shin, Smith (2001).

Overall, several variables (K, INFLR and FD3) included in this study have shown to be statistically insignificant and insufficient for determination of the economic growth and, thus, they were not satisfactory. Table 5 also shows that, only in model 1 and model 2, the measure of financial sector efficiency by deposit rate (DEP) exerts statistically significant and positive effect on the economic growth at 10 and 5 percent level, respectfully. Furthermore, although in most studies (Sachs and Warner, 1995; Freund and Bolaky, 2008) the trade openness variable had a positive effect on economic growth, in our case, particularly in Model 3 and Model 4, this variable had a negative effect on the economic growth and it was statistically significant at the 1 percent level. This finding can be explained by the fact that B&H is import-oriented economy with a high trade deficit. In most of estimated models, the coefficient of private sector credit to GDP is found to be statistically significant and negatively related to economic growth. It is clear that the ratio of private sector credit to GDP and economic growth are in an inverse relationship. Our finding is similar with the findings of Koivu (2002), Shen and Lee (2006) and Zhang (2003). In short, it has been found that an increase in private sector credit by one unit leads to decrease in units of economic growth. Conversely, our findings show a strong evidence and statistically significant relationship at the 1 and 5 percent levels, in all models, between the ratio of M2 to GDP and economic growth. This finding agrees with the findings by Calderon and Liu (2002). Capital stock (K) variable was a positively related to economic growth (Model 6) and negatively related in Model 5 and Model 7. However, our findings revealed that this variable was statistically insignificant for determining economic growth, in the long run. Contrary to recent studies, a variable FD3, as one of the proxy measures for financial deepening, does not seem to accelerate economic growth. Likewise, in one out of nine regressions, this variable was positively related to economic growth but it was statistically insignificant.



**Table 5:** Long run equilibrium effects of variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	-34.863** (-2.472)	-40.962*** (-3.245)	-14.392 (-1.719)	-6.213 (-1.042)	10.543 (0.555)	-30.465 (-2.561)	-13.911 (-1.104)	-9.808 (-1.131)	-26.107 (-1.729)	-6.087 (-0.653)
FD1	0.541*** (3.628)	0.540*** (3.922)	0.641*** (4.927)	0.763*** (5.327)	0.328*** (3.381)	0.321** (2.378)	0.374*** (3.113)	0.414*** (3.167)	0.405*** (3.856)	0.727*** (5.938)
FD2	-0.498*** (-3.181)	-0.291* (-1.896)	-0.575*** (-4.238)	-1.016*** (-5.249)	-0.625*** (-3.374)		-0.419*** (-2.866)	-0.664*** (-3.305)		-1.255*** (-5.651)
FD3									0.034 (0.756)	
K					-0.092 (-1.112)	0.126 (1.191)	-0.092 (-0.656)			
DEP	2.419* (1.978)	2.061** (2.259)								
OPEN			-0.169*** (-2.978)	-0.181*** (-4.013)						
INFR								0.282 (0.581)		
AID										-3.731*** (-3.885)
GE		-13.735*** (-3.437)	-8.059** (-2.271)			-20.559*** (-2.799)	-5.722* (-1.884)		-30.532** (-2.381)	
PS	-9.571** (-2.496)			-7.335*** (-3.721)	-3.003* (-1.736)	11.065** (2.134)		-3.681* (-1.777)	18.046** (-2.254)	-8.123*** (-4.260)
R <sup>2</sup>	0.812	0.853	0.869	0.918	0.851	0.817	0.794	0.8160	0.844	0.972
Adj. R <sup>2</sup>	0.736	0.783	0.807	0.859	0.767	0.743	0.723	0.729	0.699	0.954

**Notes:** Values in parenthesis are t statistics. \*, \*\*, \*\*\* stars refer to 10 %, 5 % and 1 % significance, respectively.

**Source:** Authors' own calculations.

Furthermore, the quality of the financial sector environment, as measured by GE and PS, showed that both coefficients were statistically significant, but negatively related with economic growth, in most of models. Obviously, these findings can be explained by the fact that B&H has poor quality of regulatory measures that inversely and adversely affected to economic growth. Also, it can be interpreted that B&H banking environment, being plagued by the low efficiency, unfavorable institutional environment and expansion of financial intermediation does not encourage growth and efficiency (see more, Mehl et al, 2005). Likewise, this outcome was in line with theoretical models proposed by Rodrik (2000) which examined the role of institutions in the process of economic growth, as well as the study conducted by Mehl et al (2005), King and Levine, (1993.a); King Levine, (1993.b) and Bordo and Rousseau (2006).

The first four modeled equations for models from (1) to (4) were estimated and analyzed by using FD1, FD2, DEP, openness, PS and GE. As shown by the obtained findings in Model 1, two explanatory variables FD2 and PS have a negative relationship with economic growth. The regression findings in Model 2 revealed that 85.33% of the variation of the economic growth was described by the explanatory variables. Accordingly, 1 percent increase in FD1, *ceteris paribus*, will increase Output Growth by 0.54%, 1 percent increase in FD2 will decrease economic growth by 0.29%, 1 percent increase in DEP *ceteris paribus*, will have a positive effect on economic growth by 2.06% and 1 point increase in GE index will translate into a negative effect economic growth by 13.73%.

The expected value of the economic growth in Model 3 reveals that when FD1 ratio increases by 1%, then the economic growth will increase by 0.64%; an increase of the FD2 ratio by 1% the economic growth will decrease by 0.57%; when OPEN ratio increases by 1%, then the economic growth will decrease by 0.18% and when the PS index increases by 1 point then the economic growth will decrease by 7.35%.

In model 10, the findings regarding FD1, FD2 and PS are coherent with other models. 1 percent increase in FD1 will increase economic growth by 0.72 %. Also, 1 percent increase in FD2 will decrease economic growth by 1.25 %. The sign of PS is a negative as expected. Some of the recent literature implies that on macro level, the impact of foreign aid on

economic growth is generally mixed. In some studies, the aid–growth relationship is a positive (Radelet, Clemens, and Bhavnani, 2005, Burnside and Dollar, 2000), but in some other studies a connection between aid and economic growth is a negative or even statistically insignificant (Ekanayake and Chatrta, 2010). Interpretations vary on country basis. In the case of Bosnia and Herzegovina, a variable aid has a disappointing effect as we observe from the coefficient, 1 percent increase in foreign aid will decrease economic growth by 3.73 %.

## 5. Conclusion

As argued in the literature review, the issue of causality between country's level of financial development and economic growth in transition countries has shown mixed results. Therefore, this paper researches and tests hypothesis whether economic growth in B&H has been strongly supported by financial deepening.

Our findings did not confirm the statistically significant and positive influence of financial deepening on economic growth of B&H, as measured by FD1, FD2, FD3 or this relationship is seemed to be unclear and questionable. The evidence shows that, in terms of economic growth, the variable FD1 (monetization ratio) is proven to be statistically significant and positive. It is important to note that our findings were proven to be in line with other studies conducted by Bordo and Rousseau (2006) and Calderon and Liu (2003).

The finding implies that only one of three indicators has a positive effect on economic growth (FD1 monetization ratio) while this relationship between the variables FD2 (the financial intermediation ratio) and economic growth is found to be statistically significant, but negative. Our empirical findings were not proven to be in line with the research performed by De Gregorio and Guidotti (1995), Levine (1998) and Rogić and Bogdan (2012).

Although this econometric analysis is constrained by sample size determination, method of specification variables (certain number of variables are omitted because of low values of the F-test), our findings of negative financial intermediation ratio to economic growth were strong in all models. Also, they indicated that the output declines, have been recorded in the period of the last four years, and a high level of non-performing loans, as well as a lack of domestic financing from

nonbank sources constrained the output growth. This conclusion can be in line with the previous study conducted by Loayza and Rancière (2005).

By the same token, we could not find any relation between the FD3 and economic growth variables in all offered regression models. The last one is in contrast with a study conducted by Kar and Pentecost (2000) in Turkey. Consequently, the level of financial development has ambiguous effects on economic growth.

Furthermore, it is interesting to note that the behavior of economic growth was strongly influenced by the quality of the financial sector's environment. Our two variables, GE and PS have proven to be statistically significant, but with a negative sign. This is understandable considering that in the Index of Economic Freedom for 2015 (rule of law, government/regulatory efficiency and open markets indexes), B&H is ranked as 97th country in the world, under the category of "mostly unfree" with poor institutional and legal environment. Despite the efforts undertaken in the post-war period to develop economic prospects through institutional improvements, B&H's economy still remains in the "mostly unfree" category, and this shows that deeper institutional reforms are needed to be implemented. Consequently, quality of the financial sector environment as measured by PS and GE proved to be a robust determinant of long-term economic development, rather than financial development. Accordingly, it can be concluded that without well-developed financial institutions any positive effects of financial development on economic growth is significantly weaker or in many cases non-existent. This opinion is consistent with the previous study conducted by Demetriades and Law (2006), as well as Mehl et al (2005). Their conclusion is that institutional quality improvements most likely have a much larger direct effects on economic growth than financial development itself. In model 10, we found a negative relationship between aid and growth. Accordingly, it can be concluded that foreign aid does not enhance the economic growth in Bosnia and Herzegovina. The direction of foreign aid's effect on economic growth can be influenced by the degree of country's sound policies and institutions (Burnside and Dollar, 2000). But in the case of Bosnia and Herzegovina it is obvious that the systemic, structural and political weaknesses of Bosnia and Herzegovina (corruption, inefficiency of institutions, lack of accountability, etc.) causes the non-transparent activities of

government institutions and poorly managed of donor funds and foreign aid. Consequently, it has shown that foreign aid has a negative and statistically significant impact on the economic growth.

Overall, our findings do not imply that financial development is important for economic growth in B&H. However, a better balanced approach to studying the relationship between finance and growth is required. Also, our findings reveals and identifies some changes are needed to be improved or enhanced a sound government policies and institutions as well as institutional quality improvements.

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## Appendix 1

### Variable Definitions

<b>Variable</b>	<b>Notation</b>	<b>Measurement</b>	<b>Expected Sign</b>
Financial Development Indicator-1	FD1	M2 to GDP Ratio	+
Financial Development Indicator-2	FD2	Ratio of Private Sector Credit to GDP	+/-
Financial Development Indicator-3	FD3	Ratio of Total Bank Deposits to GDP	+
Capital stock	K	Gross Capital Formation as % of GDP	+/-
Deposit Rate	DEP	The rate paid by commercial banks for savings deposits	+
Trade Openness	OPEN	The ratio of the sum of exports and imports to GDP Ratio	+/-
Foreign aid	AID	Ratio of Foreign aid (measured by Net official development assistance and official aid received) to GDP	+/-
Inflation Rate	INFR- proxy for the quality of the financial sector environment	Inflation, average consumer prices(% change)	+
Government Effectiveness	GE- proxy for the quality of the financial sector environment	Index, Estimate of Governance Performance (perceptions of the quality of public services, civil services, degree of political pressure)	+
Political Stability	PS- proxy for the quality of the financial sector environment	Index, Estimate of Governance Performance(perceptions of likelihood government will be destabilized)	+
Output Growth	GDP	GDP per capita Growth Rate	