

The relationship between financial deepening and economic growth: Bootstrap causality approach for the selected upper middle income countries

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Abstract. *This paper investigates the causal relationship between financial deepening and economic growth for fourteen upper middle income countries for the period during 1987-2015. Broad money supply, private credits, financial system deposit liabilities and deposit money banks' assets are determined as proxies of financial deepening. Kónya (2006) bootstrap panel granger causality approach is used for this relationship based on Seemingly Unrelated Regression (SUR) model. Empirical findings indicate that countries can be clustered according to supply-leading and demand following approach. Besides, there exists evidence for bidirectional causality for some countries.*

Keywords: financial deepening, supply-leading, demand-following, bootstrap, middle income.

JEL Classification: C33, E42, G21, O47.

1. Introduction

Bagehot (1873, p. 8) declares in his famous study providing that people demand a large portion of their money from system, banking and industrial system face a great danger. Capital markets and financial intermediaries contribute the financing process of real investment by facilitating transfers from surplus agents to deficit agents (Tobin, 1984, p. 11). The main task of financial system is to bring close together savers and borrowers, and offering risk management facilities to borrowers and lenders by the way of insurance, hedging, and financial diversifications. While financial system facilitates information flow, it also enables supervision, investigation, risk management, and liquidity opportunities (Orhangazi, 2011, pp. 124-125).

Levine (2005, pp. 869-870) emphasizes five fundamental effect of financial system over economy. Firstly, financial system submits information about practicable investments and capital allocation in advance. After providing finance for investments, it also enables supervision and usage for investments by corporate management. Moreover, it facilitates trade, diversification and risk management in economy. In addition, it fulfils the duty of corporation of savings and prompts it, and also facilitates the exchange of goods and services.

The development of financial system shows differences in lots of countries. The development of financial system increases economic growth and productivity in some countries, and it causes breakups in economic growth and financial crises in some developed and developing countries as well. Reforms and developments in financial system create effects over economic growth by inducing some reconstructions in real sector (Johnston and Pazarbaşıoğlu, 1995, p. 1). Financial deepening means growth of accumulation of financial assets in an economy more than itself. When supply of financial asset increase in an economy, their variety of quality widens, new borrowers participate sector, and financial system develops further (Shaw, 1973, p. 7). Therefore, development of financial system creates a feedback effect between financial and real development along with international integration. So, domestic financial deepening is strongly related with both higher investment and faster productivity growth (World Bank, 1997, p. 157).

Economic growth is the steady process of the economy by which the productive capacity augments over time to bring about increasing levels of national output (Todaro and Smith, 2009, p. 821). Simon Kuznets gained the Nobel Economics Prize due to his working about national income historical growth in 1971. Kuznets (1959, p. 168) described the economic growth as providing various economic goods to its population of a country in the long run capacity. It is discussed for many years that the financial development causes economic growth and these two variables have a relationship with each other. While the causality relation from financial development to economic growth is handled as supply leading, the approach of economic growth stimulates the financial development is expressed as demand following (Patrick, 1966, p. 175). Therefore the question of whether there is a relationship between these two variables comes out. The development of financial sector as supply leading, or demand following, or two-way lead to research of one-way and two way causality relation investigations.

Levine (2002, p. 424) discussed the distinction about financial system, whether is bank base or market base. According to bank based view, at the early age of economic development financial system reflect a weak institutional structure, so that bank based financial system perform its duties as like mobilizing saving, allocating capital, and exerting corporate capital better than market based financial system for the developing economies. On the other hand, classification of countries based on their income level and searching their common structure is another approach for the development of economies. According to Kharas and Kohli (2011, p. 282), countries at the middle income level, which couldn't reorient their growth strategy from resource-driven to productivity-driven, get stuck at this middle income level. Tho (2013, pp. 107-110) explains this situation based upon stages of development. Middle income countries mostly stuck between low income labour intensive industry and high income capital intensive industry, and they couldn't compete with both of them propped up wage, price, innovation and technology. Therefore, searching for economies at the middle income level from the aspect of financial structure and economic growth is the main task of this study whether they have a common trait or distinct from each other for some other reasons.

2. Theoretical background

The financial system emerges as an agent of investment-saving process. The question of whether the development of financial system has an impact over economic growth, or vice versa, states as feedback relationship between two in Patrick's (1966) working paper. This relationship consists of two hypotheses which are called as "supply-leading" and "demand-following". The supply leading hypothesis asserts that financial institutions, financial assets and financial liabilities must be created before the demand of these services. This hypothesis has two functions. First of all, the incentives and progress of entrepreneurs increase by shifting economic resources from traditional sector to modern sectors. Another point, financial intermediaries mediate the flow of financial assets from traditional sector to modern sector, and stimulate economic growth by rapidly increasing credit facilities, deposits, financial liabilities and savings (Patrick, 1966, pp. 175-176). This hypothesis put forward one-way causality relationship going from financial deepening to economic growth, and alleges that the increase in new financial markets and institutions augment financial services, and economic growth accrues as a result (Balago, 2014, p. 254).

Goldsmith (1959, 1969), Shaw (1973) and McKinnon (1973) are the main economists who investigate the impact of financial system to economic growth. According to Goldsmith (1959, p. 114), the differences in financial institutions, financial habits and attitude affect the economic development of a country, and this also affects the economic growth rate. Mckinnon (1973, p. 117) emphasizes that the development in monetary reforms can stimulate quality of capital formation and saving propensities, which increases the growth of real output. According to Shaw (1973, pp. 7-8), financial assets will grow more rapidly than non-financial assets, and accelerate economic

growth at the end of financial deepening. As a result financial deepening realizes when financial assets grow faster than income growth.

Pagano (1993, pp. 619-621) supports the view of financial development inclines economic growth via financial intermediations. Bank lending and credit channels are the main sources affecting household decisions through savings. However, amelioration in risk sharing and household credit market can reduce saving rates, so the growth rates. As for Greenwood and Jovanovic (1990, p. 1076), financial intermediation improve growth by increasing rate of return on capital, hereby high priced financial structure can be realized, and investment increases.

Cameron (1963, p. 133) emphasizes this situation with an increment in the demand for financial service cause a rise in means of payment, which contributes the economic development. Bencivenga and Smith (1991, p. 196) investigate this relation in that financial intermediaries revise the compound of saving in favour of capital accumulation, which incline to promote growth. As it can be seen, all these authors are the proponents of the view of supply leading.

Demand following approach is based on the assumption that economic growth leads to the financial development. Patrick (1966, p. 174) emphasizes that demand following approach is related with the demand side of the financial system. When the economy grows up, it creates supplement and new demand for these financial services, which causes development in financial system. Absence of financial institutions in developing economies is a display of the lacks of demand for financial services. As the real side of the economy progresses, the demand for new financial services emerge, these needs are supplied from financial system even a little. At the second step scarce resources are transmitted from small savers to large investors based on rate of return, this fosters hereby financial sector (Jung, 1986, p. 333). Robinson (1979, p. 20) is one of the main supporters of this view. He asserts that financial development goes after economic growth, and expresses it as “where enterprise leads finance follows”.

3. Summary of literature

Gurley and Shaw (1967, pp. 257-258) emphasize when financial system’s economic output is at low level, the ratio of financial assets to real wealth oversee at low levels; but when economic output and per capita income increase, the ratio increases more rapidly. Jung (1986) probes the Patrick’s (1966) claim of whether the economic growth prompts the development of financial system or financial system triggers the economic growth. Levine and Zervos (1996) support supply-leading approach by reaching positive relationship between securities exchanges and long-run economic growth. As for the approach of demand following, Murinde and Eng (1994, p. 391) define it as the growth of real economy with commercialization and monetization of agriculture and other traditional subsistence sectors determine the demand for financial services. Lucas (1988, p. 6) criticizes all that the development of financial institutions is “over-stressed” and its development has a little impact on economic growth. So, it is called as neutrality hypothesis based on non-causality of relationship (Menyah et al., 2014, p. 386). As it is

seen there are lots of studies dealing with this subject, but it is mostly difficult to reach a common trait for countries based on geography and income level.

Xu (2000) investigates this subject for forty-one developing economies for the period of 1960-1993, by adding the transmission effect of investment as well. Financial development is represented by taking the difference of geometric means of bank deposits in GDP. Empirical results imply that there exists strong positive evidence that financial development affecting growth of the economies, and investment is seen as an important channel for it with robust.

Bangake and Eggoh (2011) assess the relationship between finance and growth for seventy-one developed and developing countries for the period 1980-2007. Liquid liabilities ratio, deposit money bank assets ratio and private domestic credit ratio are taken as proxy for finance. Empirical findings suggest that economic growth have a significant impact on financial development in developed countries. However, there exists no enough evidence to support causality for developing countries in the short-run.

Kar et al. (2011) focus on the subject for MENA (Middle East North Africa) countries, which can be expressed as developing countries, by running Kónya (2006) bootstrapped panel causality approach for the period of 1980-2007. They use six different monetary, credit and deposit indicators to express financial development. After that, heterogeneities of countries and cross sectional dependencies of variables are discussed based on methodology. Empirical evidences point out that the direction of causality for fifteen MENA countries depends on the measurement of financial development. So, there are lots of evidence for supply-leading and demand-following, but there is no any common evidence. Ağır et al. (2011) evaluate this relationship for MENA countries at the same period. According to their findings, demand following approach is dominant for MENA countries and worker's remittances channel for this relationship.

Mirdala (2011) investigates the relationship between financial deepening and economic growth for the European Transition Economies for the period of 2000-2010. Broad money stock, domestic bank deposits and domestic bank loans are used as financial depth indicators. Empirical findings demonstrate that lower per capita income countries utilize more from financial deepening and supply leading evidence appears in the short-run.

Hsueh et al. (2013) deal with the subject for ten Asian countries based on Kónya (2006) panel bootstrapped causality methodology for the period of 1980-2007. They use credit claims and monetary aggregates as representatives of financial development. According to their findings, Asian countries are strongly sensitive to supply-leading hypothesis, especially China. However, demand-following hypothesis is observed for Malaysia based on narrow money aggregate, there is no any causality evidence for Philippines, India and Japan.

Mhadhbi (2014) examines the relationship between financial development and economic growth by introducing a new proxy for financial development for twenty-seven medium income countries for the period of 1970-2012 based on Kónya (2006)

panel bootstrapped causality approach. Empirical results show that there exist validity for supply-leading for three countries and demand-following for six countries. Besides, there is no evidence for this relationship for the remaining countries. Mhadhbi et al. (2017) evaluate the banking sector development with a similar manner for the same period for forty developing countries. According to their findings, there are limited evidence for both supply leading, demand following and mutual relations.

Menyah et al. (2014) assesses the issue for twenty-one developing African countries based on Kónya (2006) bootstrapped panel granger causality for the period of 1965-2008. They developed an aggregate financial development index for African countries by utilizing four financial variables based on principal component analysis. Empirical findings display that there is one demand following and three supply leading evidence for African countries, which imply that there is limited evidence to support finance lead growth or vice versa.

Özşahin and Uysal (2017) examine the relationship between financial deepening and economic growth for twelve MENA countries for the period of 2000-2014. They use domestic credit to private sector, domestic credit provided by financial sector, and liquid liabilities of financial system as a ratio of GDP in order to express financial deepening. Emirmahmutoğlu and Köse (2011) methodology is used to determine the direction of causality relation. Empirical evidence imply that five countries demonstrate supply leading hypothesis when domestic credit provided by financial system is considered, and four countries display the same manner from the aspect of liquid liabilities.

Agheli and Hadian (2017) investigate this relationship for fifteen selected emerging and Middle Eastern countries, based on Kónya (2006) bootstrapped panel methodology for the period of 1980-2013. Empirical evidence points out that low level of financial development avoid causality to economic growth due to lack of deep financial sector, but there exist both supply leading and demand following evidence for some others.

4. Data set

Annual data for the period of 1987-2015 are arranged from World Development, and Global Financial Development Indicators of World Bank (2017). According to World Bank country classification, countries have GNI per capita threshold between 4125\$-12735\$ are expressed as upper middle income based on Atlas method calculation (Fantom and Serajuddin, 2016, p. 25). While comprising data set, countries with missing data are eliminated. Besides, countries with a population under one million are also eliminated in order to avoid misspecification and reach an accurate evaluation. As a result fourteen countries are determined, three of them from MENA (Algeria, Tunisia⁽¹⁾, Turkey), two of them from Africa (Botswana, Gabon), five of them from South America (Costa Rica, Dominican Republic, Ecuador, Mexico, Peru), and four of them from South Asia (China, Malaysia, Mauritius, Thailand). The definition of variables and their data set is expressed in Table 1.

Table 1. *The definition of variables and data sources*

Variables	Series	Sources
LGDP=	Real GDP (2010)	World Bank, WDI
LBM=	Broad money (% of GDP)	World Bank, WDI
LFS=	Financial system deposits to GDP (%)	World Bank, GFDD
LDA=	Deposit money banks' assets to GDP (%)	World Bank, GFDD
LPC=	Private credit by deposit money banks and other financial institutions (% of GDP)	World Bank, GFDD

The proportion of liquid liabilities of financial system to GDP is a measure of financial depth. Liquid liabilities comprise of currency held outside the banking system (King and Levine, 1993a, p. 720) other than central government and time, saving, and foreign currency deposits of resident sectors other than the central government (WDI, 2017), expressed as LBM. Besides, this ratio also reflects the measure of the overall size of the formal intermediary sector (King and Levine, 1993b, p. 528). A high ratio of financial deepening means that financial markets perform financial transaction function much better. (Özşahin and Uysal, 2017, p. 155). This indicator is chosen (Alrabadi, 2016; Ang, 2007; Apergis et al., 2007; Čihák et al., 2012; Chisunga 2015; Ghildiyal, 2015; Hamori and Hashiguchi, 2012; Ogbuagu and Ewubare, 2017; Galetovic, 1996; Nazlıoğlu et al., 2009; Osei-Fosu et al., 2017; Rachdi and Mbarek, 2014; Saqib, 2013) as a proxy for financial depth in many studies.

Thornton (1994, p. 42) explains the difference between ratio of broad measure of money supply and total deposits. Total deposits exclude currencies. Currency is not intermediated through the banking system (Xu, 2000, p. 334). An increasing ratio of broad money to GDP may state more widespread use of currency instead of escalating of bank deposits (Demetriades and Hussein, 1996, p. 395). So, LFS variable is introduced to our analysis in order to express the ratio of bank deposit liabilities to nominal GDP. Banks are not the only intermediaries providing the functions of financial system, and banks are strongly affected from governments in many developing countries due to uncertain relationship with central bank (King and Levine, 1993a, p. 721). When the bank deposit liabilities increase, the supply of credit to private sector can remain unchanged due to government allocation of financial savings by rising reserve requirements (Demetriades and Hussein, 1996, p. 395). So that, LPC variable is determined for this situation. Shaw (1973) emphasizes the growing rate of financial asset over income growth. Therefore, deposit money banks' assets ratio is determined to represent financial asset deepening. Moreover, LGDP variable is selected as a proxy of economic growth. All variables are deal with their logarithmic values.

5. Econometrical methodology

Social scientists desire to consider that the feasibility of a case occurring in one part of the world could cause an event at a later time in a different place (Granger, 1980, p. 331). Granger (1980, p. 349) states providing that the past value of one variable is used to forecast the unexplained part of the other variable, then the prima facie causality from one to other can emerge. One of the important points is the "arrow of time". Past value of one variable gives a predicted power to forecast the present and

future values of other, but not reversible. In order to adopt Granger causality to a panel understanding, estimation method takes importance.

A method of generally encountered sets of regression equation, which is Seemingly Unrelated Regression (SUR), is more efficient in coefficient estimation rather than equation by equation application of least squares for the aggregation bias of temporal cross section data, which imply cross section dependency (Zellner, 1962, pp. 348-363). But, Zellner (1962, p. 363) did not establish an iterative procedure in coefficient estimation for small sample data. Pesaran (2006, p. 992) presents a Monte Carlo simulation to test the importance of cross section dependency. As a result, if the cross section dependence is overlooked, bias and size distortion comes out. So, the cross section dependency situation of data becomes more of an issue in panel sense. Another point is the homogeneity of the data. Even if we construct a panel data based on per capita income level of upper middle income developing countries, their development level can differ from each other based on the structure of their development (Menyah et al., 2014, p. 389). So that, testing the slope homogeneity is another important issue in panel sense.

5.1. Cross section dependency

Cross section dependency tests can be collected under four subtitles based on literature. Breusch and Pagan (1980, p. 247) introduce Lagrange Multiplier⁽²⁾ (LM) test procedure in order to test cross sectional dependency.

$$LM = M \sum_{i=1}^m \sum_{j=1}^{i-1} \rho_{ij}^2 \quad (1)$$

ρ_{ij}^2 is the estimated correlation coefficient, and it has a chi-squared (χ^2) distribution with $(m(m-1)/2)$ degrees of freedom. This test has an advantage that it does not necessitate measurement of maximum likelihood estimators, because it is based on the ordinary least square (OLS) residuals (Greene, 2003, p. 350).

$$y_{it} = \alpha + \beta_i' x_{it} + \varepsilon_{it} \quad \text{for } i = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (2)$$

Individual OLS regression is expressed in equation 2, where x_{it} is vector of $k \times 1$ explanatory variable. α and β_i are respectively individual intercept and slope coefficients. The null hypothesis of no cross section dependence $H_0: \text{Cov}(\varepsilon_{it}, \varepsilon_{jt}) = 0$ for all t and $i \neq j$ is tested against the alternative hypothesis of $H_A: \text{Cov}(\varepsilon_{it}, \varepsilon_{jt}) \neq 0$ for at least one couple of $i \neq j$. LM test is more appropriate for small amount of N and large amount of T .

Pesaran (2004, p. 5) bring a solution for the size problem of LM with CD_{LM} test, which is applicable for large T and large N .

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T\rho_{ij}^2 - 1), \text{ where } CD_{LM} \sim N(0,1) \quad (3)$$

On the other hand, this test is not appropriate for large N , and small T . Thereby, Pesaran (2004, p. 9) introduce a new CD test for this situation.

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \rho_{ij}, \text{ where } CD \sim N(0,1) \quad (4)$$

CD test is valid for T and N goes to infinity in any order, and test displays proper feature for small samples of both T and N . However, this test has an important disadvantage, which deprived from the power in certain situations where the population mean bilateral correlation is zero under heterogeneous alternatives (Pesaran, 2004, p. 14). Therefore, Pesaran et al. (2008, pp. 106-108) introduce a bias-adjusted LM test, which use exact average and variance of the test statistic with strictly exogenous regressors in the event of panel data models.

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \frac{(T-k)\rho_{ij}^2 - \mu_{Tij}}{v_{Tij}}, \text{ where } LM_{adj} \sim N(0,1) \quad (5)$$

where k is the number of explanatory variables, μ_{Tij} is exact mean, and v_{Tij} is variance of $(T-k)\rho_{ij}^2$.

5.2. Slope of homogeneity test

Pesaran and Yamagota (2008, p. 57) propose two test statistics, $\tilde{\Delta}$ (delta) and $\tilde{\Delta}_{adj}$ (delta-adjusted), in order to test slope of homogeneity of the panel data.

$$\tilde{\Delta} = \sqrt{N} \left(\frac{N^{-1} \tilde{S} - k}{\sqrt{2k}} \right) \quad (6)$$

$$\tilde{\Delta}_{adj} = \sqrt{N} \left(\frac{N^{-1} \tilde{S} - E(\tilde{Z}_{it})}{\sqrt{\text{var}(\tilde{Z}_{it})}} \right) \quad (7)$$

The null hypothesis of homogeneity, $H_0: \beta_i = \beta_j$ for all i and j , based on a Hausman type testing against the alternative hypothesis of $H_A: \beta_i \neq \beta_j$. Moreover, delta test is more appropriate for big panel data, while delta-adjusted is more proper for small panel data.

5.3. Panel Granger causality test

Kónya (2006, p. 979) proposes SUR panel approach in order to test Granger causality relations of variables based on a bootstrap procedure in panel sense. This test brings some competitive edge compared to other panel studies. First of all, it does not necessitate joint hypothesis for all panel members, but permits simultaneous correlation across them. Second, this test does not require pretesting for unit root situations of variables and their cointegration relations. Besides, it also considers the cross section dependency situation of variables, and the direction of causality is determined by Wald test with country specific bootstrap critical values. The only essential condition is to identify optimal lag structure of variables before analysing.

$$\begin{aligned}
y_{1,t} &= \alpha_{1,1} + \sum_{l=1}^{ly_1} \beta_{1,1,l} y_{1,t-l} + \sum_{l=1}^{lx_1} \phi_{1,1,l} x_{1,t-l} + \varepsilon_{1,1,t} \\
y_{2,t} &= \alpha_{1,2} + \sum_{l=1}^{ly_1} \beta_{1,2,l} y_{2,t-l} + \sum_{l=1}^{lx_1} \phi_{1,2,l} x_{2,t-l} + \varepsilon_{1,2,t} \\
&\vdots \\
y_{N,t} &= \alpha_{1,N} + \sum_{l=1}^{ly_1} \beta_{1,N,l} y_{N,t-l} + \sum_{l=1}^{lx_1} \phi_{1,N,l} x_{N,t-l} + \varepsilon_{1,N,t}
\end{aligned} \tag{8}$$

and

$$\begin{aligned}
x_{1,t} &= \alpha_{2,1} + \sum_{l=1}^{ly_2} \beta_{2,1,l} y_{1,t-l} + \sum_{l=1}^{lx_2} \phi_{2,1,l} x_{1,t-l} + \varepsilon_{2,1,t} \\
x_{2,t} &= \alpha_{2,2} + \sum_{l=1}^{ly_2} \beta_{2,2,l} y_{2,t-l} + \sum_{l=1}^{lx_2} \phi_{2,2,l} x_{2,t-l} + \varepsilon_{2,2,t} \\
&\vdots \\
x_{N,t} &= \alpha_{2,N} + \sum_{l=1}^{ly_2} \beta_{2,N,l} y_{N,t-l} + \sum_{l=1}^{lx_2} \phi_{2,N,l} x_{N,t-l} + \varepsilon_{2,N,t}
\end{aligned} \tag{9}$$

Simultaneous system equation of SUR model is expressed in (8) and (9) (Kónya, 2006, p. 981), where y represent dependent variable, which is economic growth variable, and x represent independent variables, which is financial depth variables in our model. N is the number of members of the panel ($j = 1, \dots, N$), t is the time period ($t = 1, \dots, T$), and l is the predetermined lag length (Kar et al., 2011, p. 689).

Based on these SUR systems, there is one-way Granger causality operating from X to Y in a country i if in (8) not all $\phi_{1,i}$'s are zero but in (9) all $\beta_{2,i}$'s are zero; there is one-way Granger causality from Y to X if in (8) all $\phi_{1,i}$'s are zero but in (9) not all $\beta_{2,i}$'s are zero. Moreover, there is two-way Granger causality between Y and X if all $\beta_{2,i}$'s and all $\phi_{1,i}$'s are not zero; and there is no Granger causality between Y and X if all $\beta_{2,i}$'s and $\phi_{1,i}$'s are zero (Kónya, 2006, p. 981).

6. Empirical findings

Kónya (2006, p. 982) emphasises the proper usage estimator method depending on the structure of the error terms. If there is a cross section dependency across countries (as proffered by Zellner (1962, p. 363), SUR estimator is more appropriate than OLS equation by equation estimation. Therefore, we investigate the cross section contemporaneous correlation of countries at first.

Table 2. Cross section dependency and homogeneity tests

Tests	Statistic
LM (Breusch and Pagan, 1980)	234.815***
CD _{LM} (Pesaran, 2004)	10.660***
CD (Pesaran, 2004)	9.008***
LM _{adj} (Pesaran et al., 2008)	10.640***
$\tilde{\Delta}$ (Pesaran and Yamagata, 2008)	19.264***
$\tilde{\Delta}_{adj}$ (Pesaran and Yamagata, 2008)	21.537***

Note: *** denotes statistical significance at 0.01.

The cross section dependency of across countries and homogeneity structure of panel is displayed in Table 2. So, there exist cross section dependency and our panel is heterogeneous based on empirical results. Causality test findings rely strictly on the lag length structure of the panel.

Table 3. Bootstrap panel causality results 1

Countries	Ho: LBM does not cause LGDP			Ho: LGDP does not cause LBM				
	Wald Stat	Critical Values			Wald Stat	Critical Values		
		1%	5%	10%		1%	5%	10%
Algeria	1.686	7.007	4.172	3.046	11.233***	7.805	6.088	5.317
Botswana	5.068	13.983	8.233	6.095	9.898	22.362	16.61	14.11
China	15.428***	10.165	6.392	4.835	0.923	26.173	18.728	15.302
Costa Rica	0.216	6.352	3.414	2.334	6.484	14.773	10.119	8.336
Dominican [^]	3.72	22.234	13.497	10.195	8.44	14.773	10.741	8.982
Ecuador	6.191	75.488	46.881	36.854	8.478	73.474	50.936	43.201
Gabon	8.955*	15.556	9.723	7.262	10.712**	11.211	7.816	6.281
Malaysia	0.255	23.156	10.115	6.112	16.796**	22.075	11.914	8.709
Mauritius	4.475**	7.903	4.111	2.751	9.842	50.565	36.682	30.996
Mexico	1.619	29.349	16.078	10.954	99.959***	55.711	41.619	35.281
Peru	0.019	16.314	8.655	5.855	25.94	56.947	42.114	36.389
Thailand	0.284	9.856	5.382	3.789	8.693	28.31	21.396	18.476
Tunisia	1.572	10.169	5.695	3.991	14.684**	16.138	13.269	11.889
Turkey	7.469**	13.515	7.046	4.781	46.468**	59.536	42.975	36.194

Note: ***, **, * denote significance at 1, 5, 10 percent, respectively. Critical values attained with 10.000 replications. [^] imply Dominican Republic.

Too few lags imply some crucial variables are left from the model and this misspecification will usually induce bias and incorrect findings. At the same time, too many lags waste observations and this misspecification will usually augment the standard errors of estimated coefficients, lead to imprecise conclusions. Therefore, we let different maximal lags for Y and X in each system, but do not permit to vary across countries. We let 1-4 range for yearly data and estimate (8) and (9) for each possible pairwise of ly_1 , lx_1 , and ly_2 , lx_2 respectively, and determine the combination which minimize Schwartz Information Criteria (Kónya, 2006, pp. 982-983).

Table 3 displays the results for bootstrap panel causality between financial deepening and economic growth (LBM \leftrightarrow LGDP) based on the indicator of broad measure of money supply. The neutrality hypothesis is valid for Botswana, Costa Rica, Ecuador, Peru and Thailand due to there is no any causality running from any direction. There is strictly unidirectional causality running from financial depth to economic growth for China. So, supply-leading hypothesis is valid for China for this period. Besides, supply-leading hypothesis is supported for Mauritius as well. Algeria and Mexico have strict evidence for demand following hypothesis, Malaysia and Tunisia also demonstrates the same manner. Moreover, there is bidirectional causality for Turkey and Gabon, which supports feedback effect.

Remaining causality relations are reported in Appendix. First of all, the results of bootstrap panel granger causality of financial system deposit liabilities (LFS \leftrightarrow LGDP) are taken. According to findings, there is weak evidence for China and Turkey supporting supply-leading hypothesis, but there is evidence for Peru and strong evidence for Ecuador and Mauritius. Besides, there is evidence for Algeria and Malaysia supporting demand following, and there is some evidence for Gabon and Dominican Republic displaying bidirectional causality.

Second, panel causality results from the aspect of private credits (LPC \leftrightarrow LGDP) are also shown at the Appendix. There is weak evidence for Mauritius and Thailand supporting supply-leading hypothesis. There is weak evidence for Botswana supporting demand-following. There is strong evidence for Algeria and Dominican Republic for bidirectional causality supporting feedback effect. Besides, there is evidence for Gabon and Tunisia and strong evidence for Costa Rica supporting demand-following hypothesis. On the other hand, there is no evidence for causality for the remaining countries.

Finally, panel causality results based on deposit money banks' assets (LDA \leftrightarrow LGDP) are reported at the Appendix as well. There is evidence for supply-leading hypothesis for Peru and Thailand, and weak evidence for Mauritius. On the other hand, there is evidence for Botswana, Mexico, weak evidence for Malaysia, and strong evidence for Algeria supporting demand following hypothesis. Moreover, there is evidence for bidirectional causality for Algeria and Dominican Republic.

7. Conclusion

This study aims to investigate the relationship between financial deepening and economic growth from the aspect of fourteen upper middle income developing countries for the period during 1987-2015. This period is seen important, because it includes financial liberalization period of lots of developing countries. The main purpose of the study is to search whether there is a common trait for these developing countries from the aspect of finance and growth. On the other hand, these developing countries have a common structure according to their stages of development. These countries get rid of low income level by increasing their development. But, they face with a new difficulty of replacing their import oriented investment to domestic

innovations (Eichengreen et al., 2012, pp. 42-44). Our main source of inspiration is Partrick's (1966) study. He emphasizes that underdeveloped countries face a demand-following process for their development stage due to lack of necessary financial institutions and services. As a result, we can't mention a common trait for whole upper middle income countries. We consider the main reason of this result is the different development experiences of countries. However, empirical results can be generalized from some aspects. China, Ecuador, Mauritius, Peru, Thailand and Turkey have evidence for supply-leading hypothesis based on overall findings. So, it can be asserted for these countries as "finance led growth". In addition to this, Algeria, Botswana Costa Rica, Gabon, Malaysia, Mexico, Tunisia have evidence to classify based on demand following hypothesis. So that it can be claimed for these countries as "growth led finance". At the same time, Algeria, Dominican Republic, Gabon and Turkey have some bidirectional causality mean that feedback effect can be considered for these countries. In addition to this, Dominican Republic has more strong evidence for bidirectional causality. However, neutrality hypothesis couldn't be considered for these countries leaning on overall findings. So, Lucas (1988) criticise is not valid for these countries. As a result, there are lots of evidence to allege that there is relationship between financial depth and economic growth, which can be divided into two as supply-leading and demand-following for upper middle income countries.

Notes

- (1) Tunisia is considered as upper middle income country by looking its 2014 per capita income level, because we decided to take into consideration whether its slowdown temporary, or not, leaning on Atlas Method country classification of World Bank.
- (2) N refers to T, which is time dimension; and m refers to N, which is cross section dimension in many studies as like (Pesaran, 2004; Kónya, 2006; Menyah et al., 2014; Ađır et al., 2011; Hseuh et al., 2013, Kar et al., 2014, Özşahin and Uysal, 2017; Mhadhbi, 2014, 2017).

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Appendix. Bootstrap Panel Causality Results II

Countries	Ho: LFS does not cause LGDP				Ho: LGDP does not cause LFS			
	Wald	Critical Values			Wald	Critical Values		
		1%	5%	10%		1%	5%	10%
Algeria	0.617	3.587	1.991	1.372	9.785**	9.875	7.24	6.118
Botswana	4.036	20.651	12.074	9.197	15.35	33.538	25.68	21.798
China	20.451*	38.591	24.118	19.334	0.043	13.174	9.229	7.446
Costa Rica	0.000	6.038	3.367	2.289	0.594	2.004	1.094	0.784
Dominican^	4.042*	8.316	4.443	3.015	7.185**	9.346	5.681	4.192
Ecuador	11.13***	10.114	5.351	3.743	11.212	35.554	25.926	22.009
Gabon	6.458**	10.38	6.36	4.669	18.06***	13.993	9.797	7.905
Malaysia	0.000	12.431	6.122	4.111	15.47**	23.166	14.013	10.735
Mauritius	9.997**	10.901	6.244	4.54	19.768	46.261	34.234	28.819
Mexico	0.023	6.843	3.667	2.53	5.035	16.585	10.396	7.994
Peru	32.445**	36.419	26.758	22.415	1.873	38.334	27.701	23.299
Thailand	0.002	9.655	5.718	4.139	4.048	18.312	13.119	10.883
Tunisia	0.934	19.862	11.085	7.974	23.291	38.613	30.33	26.691
Turkey	8.009*	17.45	9.604	6.95	22.981	65.001	47.272	40.089
	Ho: LPC does not cause LGDP				Ho: LGDP does not cause LPC			
Algeria	11.557***	6.237	3.926	2.953	5.99**	8.677	6.126	4.926
Botswana	1.516	10.928	5.85	4.065	30.878*	43.127	33.316	29.25
China	0.121	8.457	4.533	3.147	6.029	21.274	16.126	13.863
Costa Rica	0.448	5.716	3.285	2.363	30.719***	30.23	23.947	21.331
Dominican^	22.381***	17.23	11.058	8.448	3.504***	3.164	1.984	1.512
Ecuador	2.057	13.347	7.915	5.94	1.353	3.346	2.175	1.649
Gabon	0.198	8.844	4.671	3.098	4.45**	6.351	3.717	2.549
Malaysia	3.047	10.682	6.943	5.299	1.487	4.401	2.652	1.939
Mauritius	9.838*	20.124	11.269	8.093	31.957	103.681	72	59.723
Mexico	0.078	5.686	3.267	2.314	0.328	3.193	1.977	1.43
Peru	9.085	22.663	15.171	12.257	0.516	18.288	12.519	10.27
Thailand	19.148*	29.268	20.005	15.882	2.138	8.097	5.73	4.66
Tunisia	0.614	8.386	4.448	3.12	5.625**	7.181	5.145	4.214
Turkey	0.377	13.215	8.313	6.413	5.898	16.949	13.425	11.772
	Ho: LDA does not cause LGDP				Ho: LGDP does not cause LDA			
Algeria	3.284*	6.923	4.258	3.175	8.404***	4.679	2.811	1.997
Botswana	1.235	9.979	5.359	3.716	31.72**	40.417	29.178	25.076
China	1.167	5.985	3.147	2.179	2.03	19.113	14.826	12.936
Costa Rica	0.136	4.915	2.912	2.09	23.536**	27.504	21.951	19.235
Dominican^	20.584***	14.433	9.2	6.918	4.515**	5.516	3.475	2.686
Ecuador	3.426	13.705	8.356	6.467	2.763	5.242	3.518	2.799
Gabon	0.371	7.866	4.126	2.801	2.17	9.097	4.9	3.466
Malaysia	5.142	20.447	12.767	9.676	2.215*	5.281	3.105	2.207
Mauritius	10.137*	18.705	10.766	7.766	19.598	90.242	65.339	55.462
Mexico	0.629	12.596	7.816	6.012	2.409**	4.046	2.246	1.552
Peru	23.941**	25.824	18.563	15.438	1.955	24.055	16.745	14.041
Thailand	26.074**	28.855	19.628	15.985	0.071	3.655	2.195	1.57
Tunisia	0.371	13.852	7.78	5.822	8.764**	11.209	8.715	7.651
Turkey	1.939	11.612	7.067	5.222	15.653	42.396	32.563	27.99

Note: ***, **, * denote significance at 1, 5 and 10 percent, respectively. Critical values attained with 10,000 replications. ^ imply Dominican Republic.