

Financial Development And Economic Growth Revisited: Time Series Evidence

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Abstract—This paper examines the causality between financial development and economic growth for over 80 countries around the world with different levels of per capita income during 1970-2014. I employed the vector autoregression (VAR) approach to conduct Granger causality tests to determine the direction of causality relationship between financial development and economic growth. The results provide evidence of two of the three main views on the link between financial development and economic growth: the supply leading theory (financial development causes economic growth or positive causality); and the demand following response (economic growth causes financial development or reverse causality). The results of this study suggest that: 1) there is a strong evidence that causality exists between the financial development and economic growth, 2) direction of causality is bidirectional in countries with higher GDP per capita; 3) an evidence of positive causality running from finance to real sector growth for middle- and low-income countries. The findings are consistent with earlier literature in that the direction of causality may be country specific. However, it does not fully support King and Levine conclusion that finance is a leading sector to long run economic growth. The findings of this research give some further guidance as to whether a well-developed financial sector is a necessary condition for a higher growth rates for developing countries and provide an important policy implication both for OECD countries as well as for countries that have financial sectors that are comparatively underdeveloped.

Index Terms—Financial development, economic growth, granger causality, VAR.

I. INTRODUCTION

The main objectives of this research are to investigate the relationship between financial development and economic growth and study the effectiveness of financial sector development on long run economic growth for over 80 countries around the world during 1970-2014. I employed ADF test for unit root, Johansen-Juselius test for cointegration, Vector Autoregression (VAR) analysis and Granger Causality test as an empirical evidence. The paper exhibits further evidence concerning the long standing debate over whether financial sector development leads economic growth in a Granger causality sense for high-income, middle-income, and low-income countries around the world. The main contribution of this study is to examine the long-run dynamics and causality relationship between financial development and economic growth for selected countries around the world with different levels of per capita income using time-series methodology. VAR and Gr

anger causality tests provide further evidence on the relationship between financial development and economic growth as well as direction of causality relationships. The empirical findings clearly suggest the hypothesis that bidirectional relationships exist between financial development and economic growth for high-income countries and one-directional causality for middle- and low-income countries.

Based on the results of a Granger causality test, I found: 1) there is a strong evidence that causality exists between the financial development and economic growth, 2) direction of causality is bidirectional in countries with higher GDP per capita; 3) an evidence of positive causality running from finance to GDP growth for middle- and low-income countries. The empirical results of this papers are consistent with the conclusions of [1]-[3], and [4]. The main conclusions of this study show little evidence that financial development is a necessary precondition for long-run economic growth.

The paper is organized as follows: Section II discusses the existing research done in this area. Section III describes the data, model and methodology, Section IV presents the empirical results, and Section V discusses summary and conclusion.

II. REVIEW OF LITERATURE

A. Theoretical Background

The relationship between financial sector and economic growth has been widely studied in theoretical as well as in empirical literature. The very first formal discussion of this relationship was brought up by [5], where he argues that “well-functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best chances of successfully implementing innovative products and production processes”. [6], [7] have formally brought up [5]’s argument later.

However, there is another opposing view, which says that an expansion and development of financial sector can be caused by economic growth. That is to say that the growth in real sector with more demand on physical and liquid capital may create higher demand for more financial services. Therefore, wealthier economies have a higher demand for well-developed financial system. This argument supports an existence and possibility of a reverse causality relationship between financial development and economic growth. Endogenous growth theorists such [8]-[10] view that causality runs from growth to financial development. This view is mainly described as demand-leading relationship between the financial development and economic growth.

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Ref. [11] discussed supply-leading and demand-following causality between financial development and economic growth in developing countries. Countries at their earlier stage of development will experience positive causality relationship, which can be explained, based on supply-leading hypothesis. However, wealthier economies support demand-following causality relationship. He noted that the stages of economic development determines the direction of causality between financial development and economic growth and the direction of causality relationship changes during the stages of development. According to Patrick, there is a possibility of bidirectional causality between financial development and economic growth at certain stage of the growth.

Recent theorist such as [12] argue that there is a two-way relationship between financial development and economic growth. They examine a model in which both financial sector and economic growth are endogenously determined and the model shows bidirectional causal relationship between financial development and economic growth.

Ref. [13] noted that the role of financial development is “over-stressed.”

Still today, researchers and economists have held different views about the role and importance of a financial system in economic growth. As a summary there are four main opposing views about the causality relationship between financial development and economic growth such as: 1) financial development causes economic growth, which is known as positive causality or supply-leading causality, 2) wealthy economy places a higher demand on financial sector and therefore causes the financial development, which is known as reverse causality or demand-following causality, 3) bidirectional causality, and 4) no causality relationships at all.

B. Empirical Research

Many recent research papers in this area examined the causality relationship from the empirical perspective. [14] studied a cross section of 80 countries and found that “financial services stimulate economic growth by increasing the rate of capital accumulation and by improving the efficiency with which economies use that capital.”

Ref. [15] examined the data for 16 developing countries, found bidirectional causality in eight countries, and reverse causality in eight countries. They suggest, “causality patterns vary across countries and, therefore, highlights the dangers of statistical inference based on cross-section country studies that implicitly treat different countries as homogeneous entities, favoring time-series analysis.

Ref. [16] and [17] employed a cross-sectional modeling framework and their findings supported the hypothesis that financial development leads to economic growth.

[18] examined the long-run relationship between financial development and economic growth by employing a multivariate VAR method using the data of ten developing countries. The empirical evidence suggested the existence of only bidirectional causality for all countries, which was distinct from all previous studies.

Ref. [19] studied the causality relationship between financial development and economic growth for 19 countries belonging to the Organization for Economic Co-operation and Development (OECD) and China. They

suggest that there is a little support to the hypothesis that financial development “leads” economic growth. They suggested that financial development is not a necessary and sufficient precondition to economic growth.

Ref. [20] also studied the causality relationship between financial development and economic growth using both time-series and panel data from 30 developing countries for the period of 1970-1999. His findings strongly support the view of bidirectional causality relationship. The empirical outcome of [20]’s paper supports the previous empirical studies that “the relationship between financial development and economic growth cannot be generalized across countries because economic policies are country specific, and their success depends on, among other things, the efficiency of the institutions implementing them.”

Ref. [21] studied the long-run relationship between financial development and economic growth for 10 developing countries. Their findings suggest that there is strong evidence of long-run causality from financial development to growth and no evidence of bidirectional causality between financial deepening and output.

Ref. [4] investigated the relationship between financial development and economic growth for 16 Asian economies by using a system approach. She concluded that there is a strong evidence that causality exists between financial development and economic growth, direction of causality is bidirectional in most cases, and cases of one-way causality, such as positive and reverse causality are more prominent for middle- to low-income countries. These results are in line with earlier research done by [1], [2], and [3].

All of these results all reveal there is no unified agreement on the role of financial development in the process of economic growth.

III. METHODOLOGY

The main objectives of this study are to investigate the causal relationship between financial development and economic growth using time series data for the 82 economies with high-, middle- and low-income levels over the period of 1970-2014. Many low-income and transition economies did not have enough observations for time-series analysis, so the author was able to use the data for only 82 countries. The data frequency used in this study is annual and they are all obtained from the [22].

The variables used in this model are selected based on previous theoretical as well as empirical studies. We use GDP growth rate to measure economic growth and the ratio of domestic credit provided by financial sector to GDP (% of GDP) as a measure of financial development. Based on well-known growth theories the following control variables were used such as the ratio of trade to GDP (% of GDP), which measures the size of real sector and trade policy; the ratio of general government final consumption expenditure to GDP (% of GDP), which measures the weight of fiscal policy; and gross capital formation (% of GDP), which measures capital investment. Many studies conducted earlier used different variables to measure the financial development such as broad money, M2, and domestic credit provided by financial sector (% of GDP). Due to data availability, we had to use only available variable for all

majority of countries, domestic credit provided by financial sector (% of GDP) as a proxy for financial development. The ratio of domestic credit provided by financial sector is a very popular and widely used indicator to measure the size of financial intermediation, which includes credit issued by banks and all other financial intermediaries.

To examine long-run relationship between the financial development and economic growth, the following model with five variables is used:

$$Y_{it} = a_0 + a_1DCFS_{it} + a_3TY_{it} + a_4GOVY_{it} + a_5K_{it} + e_{it} \quad (1)$$

where Y_{it} is a GDP growth rate in country i and year t , $DCFS_{it}$ is the ratio of domestic credit provided by financial sector to GDP, TY_{it} is the ratio of total trade to GDP, $GOVY_{it}$ is the ratio of government spending to GDP, K_{it} is the ratio of gross capital formation to GDP, and e_{it} is an error term.

As it is mentioned earlier, this paper has two main objectives: 1) to examine how the financial development and economic growth are related in the long run, and 2) to examine the dynamic causal relationship between the financial development and economic growth. The testing procedure involves four steps: 1) testing for presence of unit-root by using ADF test, 2) testing for cointegration by employing Johansen-Juselius test, 3) running VAR model, and 4) conducting Granger-causality test. VAR model serves very well to meet the main objective of this research because VAR model makes it possible to identify short-run and long run causalities separately, takes into account macroeconomic variables own past values and finally, it avoids endogeneity problems.

It is important to test if macroeconomic variables have the tendency to return to the long-term trend following a shock or if they follow a random walk. Therefore, we test for presence of unit root by Augmented Dickey-Fuller (ADF). When time series variables are non-stationary or they have unit root, it is important to test for the presence of cointegrated relationship. The check if there is a certain common trend between these non-stationary series we use in this research. If non-stationary series are not cointegrated then we face a risk of having spurious regression. Suppose if two non-stationary series $Y_t \sim I(1)$ and $X_t \sim I(1)$ have a linear relationship such that $W_t = X_t - \gamma Y_t$ and $W_t \sim I(0)$, (W_t is stationary), then these two series are said to be cointegrated. In this study, we used Johansen-Juselius test for a cointegration. In 1990, Soren Johansen and Katarina Juselius [23] developed an estimation and testing procedure for time-series models with one or more cointegrating relationships. Johansen-Juselius [8] test for cointegration estimates one or more error correction equations together and obtains the estimates of the long-run and short-run coefficients. Consider a VAR of order p :

$$y_t = A_1y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \epsilon_t, \quad (2)$$

where y_t is a k -vector of non-stationary $I(1)$ variables, x_t is a d -vector of deterministic variables, and ϵ_t is a vector of innovations. There are two test statistics computed by this method: the trace statistic and the maximum eigenvalue statistic. The trace statistics test is based on the log-likelihood ratio $\ln[L(r)/L(k)]$ and it is based on the null hypothesis that the number of distinct cointegrating vectors

k is less than or equal to r against an alternative that the cointegrating rank is k . The maximum eigenvalue statistics test based on log-likelihood ratio $\ln[L(r)/L(r+1)]$, tests the null hypothesis that the number of cointegrating vectors is r against the alternative $r+1$ cointegrating vectors.

TABLE I. GRANGER CAUSALITY TEST RESULT

#	Countries	finance-GDP		GDP-finance		direction of causality
		p-value	causality	p-value	causality	
High income						
1	Australia	0.065	yes	0.223	no	positive
2	Austria	0.043	yes	0.222	no	positive
3	Belgium	0.080	yes	0.971	no	positive
4	Canada	0.503	no	0.020	yes	reverse
5	Chile	0.050	yes	0.724	no	positive
6	Denmark	0.221	no	0.056	yes	reverse
7	Finland	0.054	yes	0.907	no	positive
8	France	0.086	yes	0.424	no	positive
9	Greece	0.600	no	0.942	no	none
10	Hong Kong SAR, China	0.210	no	0.055	yes	reverse
11	Iceland	0.829	no	0.051	yes	reverse
12	Ireland	0.004	yes	0.068	yes	bidirectional
13	Israel	0.619	no	0.662	no	none
14	Japan	0.074	yes	0.059	yes	bidirectional
15	Kuwait	0.505	no	0.003	yes	reverse
16	Luxembourg	0.015	yes	0.903	no	positive
17	Malta	0.000	yes	0.000	yes	bidirectional
18	Netherlands	0.035	yes	0.257	no	positive
19	New Zealand	0.072	yes	0.159	no	positive
20	Norway	0.054	yes	0.775	no	positive
21	Panama	0.068	yes	0.369	no	positive
22	Portugal	0.018	yes	0.013	yes	bidirectional
23	Singapore	0.097	yes	0.206	no	positive
24	Spain	0.025	yes	0.040	yes	bidirectional
25	Sweden	0.594	no	0.002	yes	reverse
26	Switzerland	0.003	yes	0.248	no	positive
27	Trinidad and Tobago	0.009	yes	0.729	no	positive
28	Tunisia	0.439	no	0.069	yes	reverse
29	United Kingdom	0.039	yes	0.003	yes	bidirectional
30	United States	0.024	yes	0.799	no	positive
31	Uruguay	0.039	yes	0.553	no	positive
Middle income						
1	Algeria	0.004	yes	0.295	no	positive
2	Argentina	0.005	yes	0.641	no	positive
3	Bangladesh	0.137	no	0.061	yes	reverse
4	Bolivia	0.338	no	0.063	yes	reverse
5	Botswana	0.071	yes	0.281	no	positive
6	Brazil	0.672	no	0.166	no	none
7	Cameroon	0.046	yes	0.022	yes	bidirectional
8	Congo, Rep.	0.008	yes	0.918	no	positive
9	Dominican Republic	0.554	no	0.098	yes	reverse
10	Ecuador	0.866	no	0.749	no	none
11	Egypt, Arab Rep.	0.080	yes	0.277	no	positive
12	El Salvador	0.039	yes	0.520	no	positive
13	Gabon	0.696	no	0.194	no	none
14	Ghana	0.181	no	0.968	no	none
15	Guatemala	0.145	no	0.521	no	none
16	Honduras	0.014	yes	0.919	no	positive
17	India	0.071	yes	0.420	no	positive
18	Indonesia	0.007	yes	0.402	no	positive
19	Iran, Islamic Rep.	0.454	no	0.897	no	none
20	Jamaica	0.807	no	0.742	no	none
21	Kenya	0.234	no	0.973	no	none
22	Malaysia	0.879	no	0.240	no	none
23	Mexico	0.532	no	0.259	no	none
24	Morocco	0.969	no	0.003	yes	reverse
25	Nicaragua	0.899	no	0.533	no	none
26	Nigeria	0.935	no	0.034	yes	reverse
27	Pakistan	0.101	no	0.056	yes	reverse
28	Peru	0.525	no	0.001	yes	reverse
29	Philippines	0.062	yes	0.101	no	positive
30	Senegal	0.994	no	0.052	yes	reverse
31	South Africa	0.100	yes	0.817	no	positive
32	Sri Lanka	0.429	no	0.026	yes	reverse
33	Sudan	0.088	yes	0.028	yes	bidirectional
34	Swaziland	0.986	no	0.508	no	none
35	Thailand	0.526	no	0.002	yes	reverse
36	Turkey	0.409	no	0.794	no	none
37	Venezuela, RB	0.109	no	0.705	no	none
Low income						
1	Benin	0.849	no	0.069	yes	reverse
2	Burkina Faso	0.502	no	0.070	yes	reverse
3	Burundi	0.040	yes	0.803	no	positive
4	Central African Republic	0.166	no	0.852	no	none
5	Chad	0.690	no	0.606	no	none
6	Congo, Dem. Rep.	0.684	no	0.438	no	none
7	Congo, Dem. Rep.	0.532	no	0.775	no	none
8	Cote d'Ivoire	0.106	no	0.732	no	none
9	Gambia, The	0.030	yes	0.057	yes	bidirectional
10	Madagascar	0.016	yes	0.135	no	positive
11	Mali	0.250	no	0.436	no	none
12	Nepal	0.000	yes	0.000	yes	bidirectional
13	Rwanda	0.058	yes	0.329	no	positive
14	Sierra Leone	0.977	no	0.034	yes	reverse

Causality tests based on the augmented VAR approach of Toda and Yamamoto (1995).
 p-values associated with the null hypothesis of a causal link owing in the direction indicated.
 The nominal significance level is 10%.

However, in time-series analysis correlation and cointegration of variables do not necessarily imply the causality and detect the direction of causality relationship. Therefore, in this study we employ VAR and a Granger causality test to find the direction of causality relationship. The lag-length of the model estimated based on Akaike information criteria. The Granger method [24] tests whether x_t causes y_t and determines how much of the current value of y_t can be explained by past values of y_t . Then it can be further determined whether adding lagged values of x_t can improve the explanation of y_t . When we reject the null hypothesis then the test suggests that current and past lagged values of x_t help predict the current values of y_t .

IV. EMPIRICAL RESULTS

ADF unit root test suggests that if we fail to reject the null hypothesis then the series contain a unit root. ADF test results confirm that DCFs, T, GOV, and K almost for all countries are non-stationary at 5% significance level, and they are stationary after first differencing¹. However, GDP growth rate is stationary at levels. Based on this result we took the first difference of DCFs, T, GOV, and K to make them as stationary variables.

Then the next step in this study is to find whether these non-stationary series are cointegrated. We run Johansen-Juselius test for cointegration and found that there are at least one cointegrating relationship or equations for all countries².

A Granger causality test based on VAR is reported in Table I. Based on World Bank classification we reported Granger causality test results in three income categories such as high-, medium- and low-income countries³. Granger causality test results for high-income countries indicate the evidence of two-way causality for six countries, no causality in two countries, positive causality running from finance to growth in 16 countries, reverse causality running from growth to finance in seven country, and bidirectional causality in four countries. However, the direction of causalities between financial development and economic growth are quite different for middle-income countries. In middle-income category there are only 2 countries with bidirectional causality, 14 countries with no causality at all, 11 countries with positive causality and 10 countries with reverse causality. Similar pattern is followed for low-income countries. Granger causality test in this category indicate only 2 countries with bidirectional causality, 6 countries with no evidence of causality, 3 countries with positive and 3 countries with reverse causality. These results however are to some extent supportive to those of [14] and [25], who employed cross sectional approach and came to conclusion that “financial development is a necessary precursor of economic growth”. Based on the Granger causality test results, we can conclude that: 1) there is a relationship between financial development and economic growth; 2) the pattern of causality between financial development and economic growth may be country specific;

and 3) the direction of causality might be different due to income level; 4) bidirectional causality is more prominent for high income countries, and one-way causality is applicable for middle- and low-income countries. Our empirical findings are consistent with previous literature, where the VAR method was employed and contradicts the findings of studies where cross sectional or panel data approach were used.

V. SUMMARY AND CONCLUSION

The main objectives of this paper are to investigate the causal relationship between financial development and economic growth using time series data for the 82 economies with high-, middle- and low-income levels over the period of 1970-2014. The results provide evidence of two of the three main views on the link between financial development and economic growth: the supply leading theory (financial development causes economic growth or positive causality); and the demand following response (economic growth causes financial development or reverse causality). The empirical findings of this study suggest that: 1) there is a strong evidence that causality exists between the financial development and economic growth, 2) direction of causality is bidirectional in countries with higher GDP per capita; 3) an evidence of positive causality running from finance to real sector growth for middle- and low-income countries. The findings are consistent with earlier literature in that the direction of causality may be country specific. However, it does not fully support [9]’s conclusion that finance is a leading sector to long run economic growth. The findings of this research give some further guidance as to whether financial sector development is a necessary condition for a higher growth rates for developing countries that have comparatively underdeveloped financial sectors.

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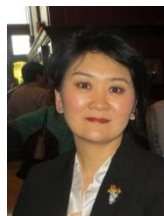
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¹ADF test results can be obtained upon request from the author.

²Johansen-Juselius test results can be obtained upon request from the author.

³Please, see Appendix 1 for World Bank income definition and category

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