Does finance lead or lag growth? evidence from Malaysia

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Abstract

Finance has played a significant role in the process of economic growth. There have been many attempts to shed light on the direction of Granger-causality between finance and growth for helping the policy makers. But the issue of direction of Granger-causality has remained unresolved. This paper is an attempt to revisit that issue as to whether finance leads or lags growth in a developing economy. The standard time series techniques are applied for the analysis. Malaysia is taken as a case study. The findings tend to indicate that finance lags growth at least in the context of Malaysia during the period under review. This finding has a strong policy implication in that the Government has to take a pro-active role to enhance the growth of the economy in order to develop the financial sector..

Keywords: Finance, growth, lead-lag, Malaysia

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1.0 Introduction

This paper is an exercise to revisit the controversy regarding the direction of Granger-causality between finance and growth in a developing economy such as, Malaysia. The authors have relied on the data provided by the World Bank and indirectly the IMF too. On a wider scope and scale, the World Bank, as part of its global initiative to elevate the status of development of under-developed and developing countries to the ranks of developed countries, collects and publishes numerous annualised time-series data on development indicators. It compiles the most current and accurate global development data available, and includes national, regional and global estimates. The broad-categories include environment, health, financial sector, poverty, science and technology and many others.

Taking a narrow and focussed approach and for reasons outlined in the ensuing pages, the trio of Thorsten Beck, Asli Demirguc-Kunt and Ross Levine (1999) under the aegis of the World Bank, introduced in 1999 a new time-series database of indicators of financial development and structure across countries.[1] As elaborated in their article this database is unique in that it unites a wide variety of indicators that measure the size, activity and efficiency of financial intermediaries and markets. Financial intermediaries constitute the banking and non-banking institutions. They dissected and consequently added new indicators, being sub-classification of previous broader categories, such as, isolating public from private share of commercial banks, size and activity of non-bank institutions and segregating measures on the size of bond and primary equities.

In 2010, they constructed an updated and expanded edition of the 1999's database. In the accompanying article, they manifest their intention on capturing trends in structure and development of financial institutions and markets and, of equal significance, the deepening of these financial systems over the past decade along several dimensions.[2] One discernible and unsettling trend relates to the uneven progress and impact across income groups and regions. Specifically, the deepening

[1] Beck, Demirguc-Kent, Levine (1999), "*A New Database on Financial Development and Structure*"
[2] Beck, Demirguc-Kent, Levine (2010) "*Financial Institutions and Markets across Countries & over Time – Data and* Analysis"

is primarily concentrated in high-income countries while the middle-to-low income countries registered insignificant measures.

For purpose of this study, the authors have confined the econometric modelling and analysis on time-series data (indicators) for Malaysia. Thus, it is not a comparative analysis between countries nor is it intended to unravel and discover new correlations or theories. In effect, this study hinges on Levin's finding that financial services stimulate economic growth by increasing the rate of capital accumulation.[3] Levin went one step further in linking financial services with improvements in efficiency with which economies use capital. In a nutshell, this is a study to authenticate the case for Malaysia.

2.0 Main Objectives / Issues of the study

Since gaining independence in 1957 Malaysia has charted phenomenal growth in most areas of development. Noticeable and rapid growth occurred from mid 1970's onwards. Unassumingly, the discovery and extraction of oil and gas deposits bring considerable wealth that enriches the country's monetary reserves. The external trade balance has always been to Malaysia's favour, ever since, except in brief spells during crisis years. This sudden wealth was, and still is, put into good use. The government embarked on massive expenditures in infrastructure built-ups, poverty eradication programmes, modernising agricultural and industrial capabilities and many other conceivable initiatives and programmes which would raise the standard of living of the general populace.

Taking a leaf from the many empirical studies cited above, these structural and social developments would not have brought about wide-ranging economic growth if not coupled with the liberalisation of the financial sector. What it means by liberalisation is that banking services, which today we assume as our birth-right, is no longer designated for the select few. It is within the reach of the ordinary citizen. Understandably, this in itself should precipitate multiplier effects on economic growth.

[3] King & Levine 1993, *"Finance and Growth: Schumpeter Might be Right"*

Malaysia desires to attain developed status by 2020. World Bank defines developed status as one whose country's per capita GDP hits USD12,000 or higher. Hence, Malaysia has to register a consistent and healthy annual GDP growth of at least 6%. Accordingly, there is a need to track and measure the relevant indicators (factors) of growth. As alluded to earlier, there are 2 broad categories of these indicators available from the World Bank. A whole gamut of economic development indicators resides in one database[4] while a cluster of financial-related indicators can be found in the financial development and structure database.[5] Intuitively then, the objective of this study is to authenticate King and Levine's findings, that is, higher levels of financial development stimulates economic growth in the country-context of Malaysia. Possibly too, several other policy implications could emerge from this study.

3.0 Motivation

As a concerned citizen of this nation, this study could possibly shed some light on one of two major policy implications: the first case is the need to further expand the level of financial sector development in order to attain the desired GDP growth, or secondly, the reverse effect, concentrate on GDP growth which invariably raises the level of financial development.

4.0 Literature Review

To pre-empt the topic of this study, we shall briefly go back to 1911 and unveil an Austrian- American economist by the name of Joseph Schumpeter who postulated that the services provided by financial intermediaries, which encompasses mobilising savings, evaluating project, managing risk, monitoring managers and facilitating transactions, are essential for technological innovation and economic development. As early as 1969, Goldsmith and later McKinnon in 1973 conducted empirical work illustrating the close ties between financial and economic development for some of the countries. There were sceptics among influential economists who downplay the

[4] http://data.worldbank.org/data-catalog/global-development-finance
[5] http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/FinStructure_2009.xls

significant role of finance on economic development. They contended reverse causality, that is, economic growth precedes and promotes financial development.

In 1993, King and Levine published their seminal paper[6], with an unassertive title, documenting a strong and robust correlation between the indicators of financial development and economic growth. They however issued a disclaimer linking specific financial sector policies with long-term growth.

During the decade leading to 1999, the importance of financial development to economic growth gained momentum as manifested by expanded literature. Other empirical studies have substantiated that active companies residing in countries with active stock market grow faster and Rajan and Zingales have demonstrated that industries relying on external finance grow faster in countries with better-developed financial systems.[7]

Also, we became aware of Masih's article [8], which applied the then newly discovered technique of Long-Run Structural Modeling (LRSM), conceived by Pesaran and Shin[9] to the country-case of Saudi Arabia. Briefly, Masih, El-Alg and Madani (2009) evidenced that Saudi Arabia adheres to a supply-leading hypothesis alluding to Patrick's terminology[10] . This hypothesis conjectures a causal relationship from financial development to economic growth.

5.0 Methodology

For over 60 years from 1930 to 1990, the econometric modelling tool available was the ubiquitous Classical Linear Regression analysis. Ordinary least square was the method used to estimate the parameters of the regression equation. Amongst a host of many assumptions of Regression, stationarity condition, which most users are unaware of, very seldom holds true for Financial time-series data. Thus, any discovery of significant relationship between variables exemplify spurious regression.

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[6] Robert King, Ross Levine, (1993) *"Finance and Growth: Schumpeter Might be Right"*
[7] Rajan & Zingales (1998), *"Financial Dependence and Growth"*
[8] Masih, Al-Elg & Madani (2009), *"Causality between financial development and economic growth: an application of Vector Error Correction and Variance Decomposition Methods to Saudi Arabia"*
[9] Pesaran & Shin (2002), *"Long-run Structural Modeling"*
[10] Patrick, H T (1966), "*Financial development and economic growth in underdeveloped countries"*

To this end and for purpose of this study, the methodology used is broadly called time-series technique. Strangely, this technique does not rely on any theory at the onset. It comprised of 8 distinct steps, each having its own specific function and purpose; beginning with the test for non-stationarity of the variables which foretell the need to apply time-series technique. The second step is to determine the optimal lag order for the vector auto-regression (VAR) model which is used as an input to the test for cointegration. The cointegration technique was pioneered by Engle and Granger. Two or more variables are said to be cointegrated if they trend together; put in a different way: they exhibit a long-run equilibrium relationship. When there is cointegration, a Ganger causality must exist in at least one direction either unidirectional or bidirectional. This test though fall-short of specifically identifying in which direction the Ganger causality is.

The fourth step is a comparatively recent technique called LRSM developed by Pesaran and Shin. Prior to LRSM, the estimates of the cointegrating vectors were chided as atheoretical; lacking a theoretical basis. LRSM addresses this limitation by infusing identifying and over-identifying restrictions onto the long-run relations of vectors. These restrictions are based on a prior information of economic or financial theories. Evidently, the LRSM procedure could produce more than 1 plausible results.

Vector Error-Correction Modelling (VECM), being the fifth step, steps-in to augment the inadequacy of cointegration. One other accolade due to Engle and Granger, they demonstrated that changes to the cointegration variables, either of the endogenous or exogenous variety, are a function of the level of disequilibrium in the relationship. This disequilibrium is being captured and represented by the error-correction term. Applying the *t-test* to the lagged error-correction term and/or the *F-test* to the joint significance of the sum of the lags of each explanatory variable will reveal the endogeneity and exogeneity attributes of these variables, hence effectively pinpointing the direction of the Granger-causality. Additionally, VECM enables us to distinguish between 'short-term' and 'long-term' Granger causality. It is not the end of the road yet as far as the time-series technique is concerned. VECM could not account for the relative degree of endogeneity or exogeneity amongst the variables.

The sixth step is called Variance Decompositions (VDCs). VECM weaves its test on Granger-causality within the sample period data. This delimits VECM from providing any indication or measure on the relative strength of the endogeneity and exogeneity

of the variables for out-of-sample data. VDCs achieve this by decomposing the variance of the forecast error of a certain variable into proportions attributable to shocks in each variable in the system including its own. The variable that is optimally forecast from its own lagged values will have all its forecast error variance accounted for by its own disturbances.

The Impulse Response Functions (IRFs) and the Persistence Profiles (PF) constitute the last 2 steps. They are not part and parcel of the time-series technique per se. Both are different representations of the information contained in the VDCs. Both map out the dynamic response path of the long-run relations. The main difference is that PF traces out the effects of a system-wide shock on the long-run relations, while IRFs is concerned with the effect of a variable-specific shock. Accordingly, PF indicates the time horizon needed to revert to equilibrium after infusing a system-wide shock.

6.0 Empirical Approach

The estimation method used is a linear time-series technique called cointegration and error correction modelling. Tests were conducted on Micofit software.

To represent the financial sector, the following indicators were chosen:

1. *dbacba* – Ratio of deposit money bank claims on domestic nonfinancial real sector to the sum of deposit money bank and Central Bank claims on domestic nonfinancial real sector. This is a measure of the relative importance of commercial vis-a-vis the Central Bank. Countries where deposit money banks have a larger role in financial intermediation than Central Banks can be considered as having higher levels of financial development.

2. *llgdp* - Ratio of liquid liabilities to GDP. Liquid liabilities consist of currency held outside the banking system plus demand and interest bearing liabilities of banks and non-banks. This is touted by many users as a measure of "financial depth".

3 *fdgdp* – Financial system deposits / GDP. This is the ratio of all checking, savings and time deposits in banks and bank-like financial institutions to

economic activity and is also an indicator of deposit resources available to the financial sector for its lending activities.

There have been many other suitable candidates from the database but they were either dropped due to insufficient number of observations such as, Bank ROE, Stock Market capitalisation etc., or they could not satisfy the necessary conditions such as non-stationarity. Some of these indicators are: Bank Credit / Bank Deposits, Private Credit by Deposit Money banks /GDP etc.

For economic growth, the following indicators were painstakingly selected:

1. *pcgdp* - GDP per capita is gross domestic product divided by midyear population. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant U.S. dollars.

2. *gdigdp* - General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defence and security, but excludes government military expenditures that are part of government capital formation.

Similar situations happens as per the financial sector. There have been several indicators which are best fit as a good measure but were dropped due to insufficiency of observations or problems caused by non-stationarity or rejection in subsequent steps.

7.0 Analysis of Empirical Results and Interpretation

Based on the 8 steps outlined in Section 5.0, we provide below a brief description of each step and an analysis and interpretation of their results.

7.1 Non-stationarity of Variables at Level Form

Cointegration requires that the variables are non-stationary at its level form but stationary for its differenced form. For the level form, we take the log of its value. The differenced form is derived by taking the difference between the present value and the value of 1 previous period. This is designated as I(1). The numeral in parenthesis refers to the lag order. If lag 1 is proven to be non-stationary then we shall proceed to take the difference of 2 previous periods and so on. Higher lag order means we will be working with fewer observations or lesser degree of freedom. Taking the difference would remove information about long-term relationship or trend of the variables. To test for stationarity, the Augmented Dickey-Fuller (ADF) test was used. Except for dbacba, all other variables had their test statistics below their critical values, for both categories: 'not a trend' and "linear trend". For dbacba, we considered the majority. The null hypothesis is non-stationary.

We then check for stationarity of the differenced form. From the test results, using the majority criteria, all 5 differenced variables are stationary implying that their test statistics exceed their corresponding critical values. Hence, the null hypothesis is rejected.

7.2 Determining the order (lags) of the VAR model

Executing the respective Microfit function, we obtained the maximum order of 6 for AIC and order 0 for SIC. Given this seemingly wide discrepancy, we checked for serial correlation for each of the variables. The results are provided in the following table.

Variable	Chi-Sq: p-value	Status
dbacba	.002	Serial correlation exist
llgdp	.027	Serial Correlation exist
fdgdp	.07	No serial correlation
pcgdp	.997	No serial correlation
gdigdp	.236	No serial correlation

Three out of the five variables have no serial correlation. As such, it is tempting to choose a higher order (let say 4 or 5) but due to a small sample size of annual data, and not to risk over-parameterisation, it is safe to choose order of 2.

7.3 Testing Cointegration

We are using the Johansen ML approach to test for cointegration. The null hypothesis is no cointegration. From the LR test based on Trace we noticed that the statistics for r=0 exceeds both the 95% and 90% critical values. Hence, we reject the null, and conclude that there is cointegration among the variables.. Based on previous findings, such as by King and Levine, it would be spurious if there has been no cointegration. Either the causality flows from financial development to economic growth or vice-versa. From the results it is also evident that there is only 1 cointegrating vector.

Cointegration, though, does not in any way indicate the direction of Granger-causation, that is, which is the leading and correspondingly the lagging variables. In other words, it does not distinguish the exogenous from endogenous variables. In essence, cointegration estimates are atheoretical in nature.

7.4 Long-Run Structural Modelling (LRSM)

LRSM was introduced to address the shortcomings of cointegration. A prior information tells us that the 2 most dominant indicators are *llgdp* (liquid liability – financial depth indicator) and *pcgdp* (GDP per capita – economic indicator). Immediately, these are the 2 which received attention.

We began with identifying *pcgdp,* being the dominant economic growth variable. We calculated the t-ratios and discovered that none of the variables are significant. We then proceed to apply over-identifying restrictions to *llgdp*, the “financial depth” indicator. For *pcgdp* =1; *llgdp* =1, the Chi-sq p-value is significant (less than 0.05). Thus, the null hypothesis is rejected and so is the restriction. Likewise when we set *pcgdp* = 1 and *llgdp* = 0; the p-value is insignificant. Thus, this restriction cannot be rejected.

As depicted in the results in Appendix 5, only the following combination: *pcgdp*=1; *fdgdp*=1, of over-identyfying restrictions hold.

Next we began afresh by first identifying *llgdp*. None of the variables has their t-ratio values significant. We then proceed to over-identifying the restrictions and found that only the fifth variable, *gdigdp*, has it p-value insignificant, hence restriction cannot be rejected. . By inferring to past findings, we think *gdigdp* is quite improbable to be the key determinant variable.

We also tried-out *dbacba* and *gdigdp* making them the leading identifying variables and found the p-values to be significant; thus over-identifying restrictions are rejected.

As for *fdgdp*, only the over-identifying restrictions for *pcgdp* (expected) and *gdigdp* are accepted.

Based on the above analysis, the cointegrating equation is: (numerals in parentheses are SE).

$$\underset{}{\text{fdgdp}} + \underset{}{\text{pcgdp}} - \underset{(4.19)}{2.63\ \text{dbacba}} - \underset{(\ 0.28)}{1.67\ \text{llgdp}} - \underset{(0.34)}{0.36\ \text{gdigdp}} - \underset{(0.01)}{0.03} \rightarrow \text{I(0)}$$

At this juncture, we can assume that the direction of causality is from *fdgdp* to *pcgdp.* Incidentally, this looks very familiar. The direction of causality is consistent with Masih's et a l(2009) country-case findings for Saudi Arabia.

7.5 Vector Error Correction Modelling (VECM)

VECM typically indicates which of the variables are endogenous and exogenous. We ran the procedure for each of the variables and found 2 variables whose t-ratio p-value for the error-correction term are insignificant:

Variable	p-value	Status
dbacba	0.685	Not significant. exogenous

pcgdp	0.165	Not significant. exogenous

The *ecm* for the other variables are significant, hence, endogenous. This is startling because it contradicts the findings in 7.4 that the direction of causality is from *fdgdp* to *pcgdp*. For it to hold, the *pcgdp* must endogenous or the dependent variable. Looking ahead at the next step, i.e. Varaince Decomposition, which ranks the relative endogeneity and exogeneity of variables (time horizon of 10 years), it also verified that *pcgdp* is exogenous.

7.6 Variance Decompostion (VDC)

We ran both procedures of the VDC: orthogonalised and generalised. The latter is known to be a better measure (robust) as it is invariant to the order of the variables. The 2 tables below depict the results respectively.

Orthogonalised	XDBACBA	XLLGDP	XFDGDP	XPCGDP	XGDIGDP
XDBACBA	97.4	0.6	0.	1.9	0.1
XLLGDP	10.4	18.5	7.4	59.9	3.8
XFDGDP	8.7	15.2	26.3	45.8	4.0
XPCGDP	1.7	1.2	5.5	87.8	3.8
XGDIGDP	7.9	8.6	3.7	52.9	26.9

The exogenous variables are *dbacba a*nd *pcgdp* in order of strength. The most endogenous (or least exogenous) is the *llgdp*.

Generalised	XDBACBA	XLLGDP	XFDGDP	XPCGDP	XGDIGDP
XDBACBA	91.8	2.1	1.8	4.1	0.2
XLLGDP	7.9	13.4	14.8	37.2	26.7
XFDGDP	8.4	13.7	19.2	32.6	26.1
XPCGDP	1.3	1.5	2.4	75.1	19.7
XGDIGDP	5.4	8.1	5.8	28.8	51.9

We get similar results for the generalised VDC. The *dbacba* and *pcgdp* are the most exogeneous variables in order of strength. The least endogenous is *llgdp.*

In this instance, being exogenous means shocks have short-term effects on the variable and that the error-term variance can be explained mostly by itself. Conversely, for endogenous variables, shocks are also explained by other variables.

7.7 Impulse Response Functions (IRF)

IRF, essentially, represents VDC results in graphical form. IRF maps out the dynamic response path of a variable owing to a one-period SD shock to another variable.

7.8 Persistence Profiles (PP)

PP deals with system-wide shock while IRF traces the effects of a variable-specific shock on the long-run relations. Additionally, PP present in graphical form the time horizon required to get back to equilibrium after a system-wide shock. From the graph it can be deduced that it takes 4 years to get back to equilibrium after a system-wide shock.

8. Conclusion and Policy Implication

We started with the notion and belief that the level and depth of financial development will spur a country's economic growth. We also believe that Malaysia will be one of the many supporting evidences just like the Saudi Arabia. We are aware that it is quite probable that certain countries may show the opposite causality effect. Patrick (1966) called these two divergent states as supply-leading and demand-following causalities. The former conjectures a relationship from financial to economic growth. The latter is the reverse.

As we progressed through the LRSM technique, disturbing events started to unfold. It was revealed that the financial depth indicator (*llgdp*) is not the leading variable to

represent financial development as touted by many. A worthy substitute was found in *fdgdp* (financial system deposit / GDP). This coincides with Masih's et al (2009) work for Saudi Arabia. They had chosen bank deposits / GDP to proxy financial development.

The straw that broke the camel's back is when results from VDC confirmed that *pcgdp*, the growth variable, is exogenous. This implies that *fdgdp* has to be endogenous else there could not be any Ganger causality whatsoever, i.e. cointegration vector. Using Patrick's terminology, Malaysia adheres to a demand-following relationship. Looking back at Malaysia's development programme since independence, the government had and is still massively allocating national expenditures on basic infrastructure needs, industrial and agricultural master plans and public amenities in all sectors, including education, transportation etc. Almost all sphere of economic activities are either government-driven or government-stimulus. This may run contradictory to Patrick's pioneering discovery that at an early stage of economic development a supply-leading relationship should prevail.

On financial development per se, Malaysia has always taken a cautious approach as most developing country would do. Any radical or unfamiliar change to the financial system may bring about instability, at least in the short-run, instigating a public out-cry. This may invariably frustrate the level of financial development.

Sooner or later, as Malaysia progresses towards developed status and commit less to government-led economic impetus, financial development will exert a greater causality role. In which case, it has to be a supply-leading relationship. As for this study, Schumpeter might have been wrong!

References

Beck T., Demirguc-Kent, A. and Levine, R. (1999), *A New Database on Financial Development and Structure*, Financial Sector Discussion paper No. 2, World Bank, September.

Beck, T., Demirgur-Kent, A. and Levine, R.(2010), Financial Institutions and Markets across Countries and over Time: The Updated Financial Development and Structure Database ,*World Bank Economic Review*, 24(1), 77 - 92

Bencivenga, V. R. and Smith, B.D.(1991), Financial Intermediation and Endogenous Growth, *Review of Economic Studies*, 58(2), 195-209

Greenwood, J and Jovanovic, B.(1990), Financial Development, Growth, and the Distribution of Income *Journal of Political Economy*, 98(5), 1076-1107

King, R.G. and Levine, R. (1993), Finance and Growth: Schumpeter Might be Right, *Quarterly Journal of Economics*, 108 (3), 717-737

Masih, M., Al-Elg, A. and Madani, H.(2009), Causality Between Financial Development and Economic Growth: An Application of Vector Error-Correction and Variance Decomposition Methods to Saudi Arabia, *Applied Economics,*, 41 (13), May, 1691-1699

Patrick, H T (1966), Financial development and economic growth in underdeveloped countries, *Economic Development and Cultural Change,* 14, 174 -189

Pesaran, M. H.and Shin, Y. (2002), Long-run Structural Modeling, *Econometric Reviews*, 21, 49 -87

Rajan, R. and Zingales, L. (1998), Financial Dependence and Growth, *American Economic Review*, 88(3), 559 -586

Schumpeter, J. A (1911), *The Theory of Economic Development*, Cambridge, MA, Harvard University Press.