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Do Financial Development and Inflation Influences Malaysia Economic Growth? An Application of Bound Test

Abdul Rahim Ridzuan^{a*}, Muhammad Waqas Khalid^b, Nur Izzati Zarin^c, Mohd Idham Md Razak^a, Abdul Rauf Ridzuan^a, Irzan Ismail^a, Norsabrena Norizan^a

Faculty Business Management, Universiti Teknologi MARA, Melaka Campus, Malaysia^a

Department of Economics, PMAS Arid Agriculture, University Rawalpindi, Pakistan^b

Department of Education, Faculty of Language and Education, Kolej Universiti Islam Melaka, Malaysia^c

Email: rahim670@staf.uitm.edu.my

Abstract

It is generally thought that there is a negative long-term relationship between inflation and growth and a positive long-term relationship between financial development and growth. The existing empirical literature suggests that the finance-growth relationship is more robust than the inflation-growth relationship. This paper empirically examines the short and long run inflation led growth nexus as well as finance led growth nexus during the period ranging from 1985 up to 2010 by using time series technique known as ARDL approach. Besides inflation, we also included other significant variables such as real gross domestic investment, foreign direct investment inflow and openness ratio to border the scope of this research. The findings revealed that inflation led growth nexus is valid for Malaysia and contributed the highest growth towards Malaysia economy as compared to financial development and other selected macroeconomic determinants.

Keywords: Inflation Led Growth Nexus, Finance Led Growth Nexus, ARDL

Introduction and Past Studies

Malaysia economy has shown a remarkable progression in recovery after Asian Financial Crisis 1997 as well as Global Recession in 2007-2008. Based on the International Monetary Fund (IMF) report 2006, Malaysia economy grew by 5.9 percent and this growth rate is above the ASEAN rate (Associations of Southeast Asian Nations). Besides, the growth rate is recorded slightly higher as compared to emerging economies such as India and China. Besides achieving sustainable growth, the country also has achieved steady inflation rates during these past twenty

years. Malaysia's inflation rate was recorded at 1.40 percent in August 2012. Historically, from 2005 until 2012, Malaysia have 2.7 percent average inflation rate reached an all-time high of 8.5 percent in July 2008 and record was low at -2.4 percent in July 2009. Achieving low inflation is a necessary condition for fostering high economic in developing country like Malaysia.

Interaction between inflation and economic is a matter of great importance and debate among the macroeconomists. Inflation also gives the negative effect for the long-term growth. Although the debate about the precise relationship between inflation and growth remains open, the question of the existence and nature of the link between inflation and economic growth has been the subject of considerable interest and debate. According to Mallik, G. and A. Chowdhury (2001), different schools of thought offer different evidence on this relationship. For example, structuralist believes that inflation is essential for economic growth, whereas the monetarist see inflation as detrimental to economic growth.

The vast empirical growth literature has come up with numerous plausible explanations of cross-country differences in growth, including the degree of macroeconomic stability, international trade, resources endowment, legal system effectiveness, religious diversity and educational attainment. The list of likely factors continues to expand, apparently without limit (Khan and Senhadji, 2000). The role of financial sector has begun to receive attention more recently as one of those possible factors contributing to economic growth. Ridzuan et al. (2017) has tested the impact of financial development in advanced countries such as South Korea and France. Based on the outcomes, the researchers found out that financial development led economic growth in South Korea, however, the inverse relationship occurred for France.

Among the studies on finance led growth focused on Asian economies have been conducted by Al-Yousif (2002), Choong et al. (2003), Vaithilingam et al. (2005) and Habibullah and Eng (2006). For example, more recent study by Ridzuan, Ismail, and Hamat (2017), found out that deepening financial development lead towards higher economic growth for the case of Singapore. Meanwhile, for Malaysia case, Choong et al. (2003) and Vaithilingam et al. (2005) examined the finance growth nexus from the perspectives of the stock market and banking sector by adopting ARDL technique. The study found that the stock market tends to stimulate growth during the period 1978-2000, while the positive effect of the banking sector on growth is found on the latter study during 1976-1999. On the other hand, Habibullah and Eng (2006) found that the financial intermediation and financial reform adopted by 13 Asian developing countries has improved economic growth.

Reviewing earlier studies conducted either in the emerging or advanced economies on finance-growth nexus, economists hold different views on the existence and direction of causality between financial development and economic growth. Earlier empirical studies on this issue documented mixed and inconclusive findings. This could be partly due to a number of reasons. Examining the finance-growth nexus by adopting different methods, sets of data, and samples of the study may lead to the inconsistent findings. This study is, therefore, aimed at empirically re-examining the short- and long-run relationships between financial development and economic

growth in Malaysian by adopting the latest technique autoregressive distributed lag (ARDL) bound testing approach to test for cointegration.

Methodology

In this paper, following model was adopted as follows: -

$$\text{GDP} = f(\text{GFCF}_{it} + \text{BPCG}_{it} + \text{OPN}_{it} + \text{FDI}_{it} + \text{CPI}_{it} + \text{DUM1} + \text{DUM2}) \text{-----}(1)$$

Where:

GDP = Real Gross Domestic Product

GFCF = Real Gross Fixed Capital Formation (of % GDP)

BPCG = Bank Private Credit (of % GDP)

OPN = Openness Ratio

FDI = Foreign Direct Investment Inflow (of % GDP)

CPI = Consumer Price Index

DUM1 = Asian Financial crisis on 1997 to 1998

DUM2 = Global Financial Crisis 2007 to 2008

To test the stationarity of each variable, the log form of the variables was used. Log transformation can reduce the problem of heteroscedasticity because it compresses the scale in which the variables are measured, thereby reducing a tenfold difference between two values to twofold difference (Gujarati, 1995).

$$\text{LGDP} = \alpha_0 + \beta_1 \text{LGFCF}_{it} + \beta_2 \text{LBPCG}_{it} + \beta_3 \text{LOPN}_{it} + \beta_4 \text{LFDI}_{it} + \beta_5 \text{LCPI}_{it} + \text{DUM1} + \text{DUM2} + v_{it} + u_{it} \text{---}(2)$$

In this study, the short and long-run dynamic relationships between economic growth and other variables are estimated by using the newly proposed ARDL bound testing approach which was initially introduced by Pesaran et al. (1997). The ARDL has numerous advantages. Firstly, unlike the most widely method used for testing cointegration, the ARDL approach can be applied regardless of the stationarity properties of the variables in the samples and allows for inferences on long-run estimates, which is not possible under the alternative cointegration procedures. In other words, this procedure can be applied irrespective of whether the series are I(0), I(1), or fractionally integrated (Pesaran et al. 1997); and Bahmani-Oskooee and Ng, 2002), thus avoids problems resulting from non-stationary time series data (Laurenceson and Chai, 2003). Secondly, the ARDL model takes sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework (Laurenceson and Chai, 2003). It estimates $(p+1)^k$ number of regressions in order to obtain optimal lag-length for each variables, where p is the maximum lag to be used, k is the number of variables in the equation. Finally, the ARDL approach provides robust results for a smaller sample size of cointegration analysis. Since the sample size of our study is 25, this provides more motivation for the study to adopt this model.

ARDL Model for Malaysia

Let the long run relationship between the six variables in log linear form be given as follows

$$LGDP_t = \alpha + \beta_1 LGFCF_{t-1} + \beta_2 LBPCG_{t-1} + \beta_3 LOPN_{t-1} + \beta_4 LFDI_{t-1} + \beta_5 LCPI_{t-1} + \varepsilon \text{ -----(3)}$$

Equation 3 above basically incorporates the short run dynamics into the adjustment process.

$$\Delta LGDP_t = \alpha + \sum_{i=1}^p \sigma_i \Delta LGDP_{t-i} + \sum_{i=0}^s \beta_i \Delta LGFCF_{t-i} + \sum_{i=0}^r \epsilon_i \Delta LBPCG_{t-i} + \sum_{i=0}^q \epsilon_i \Delta LOPN_{t-i} + \sum_{i=0}^t \theta_i \Delta LFDI_{t-i} + \sum_{i=0}^w \pi_i \Delta LCPI_{t-i} + \gamma_1 DUM1 + \gamma_2 DUM2 + d\varepsilon_{t-1} + u_t \text{ -----(4)}$$

Finally, the Model was Transformed into Bound Testing Approach

$$\Delta LGDP_t = \alpha + \sum_{i=1}^p \sigma_i \Delta LGDP_{t-i} + \sum_{i=0}^s \beta_i \Delta LGFCF_{t-i} + \sum_{i=0}^r \epsilon_i \Delta LBPCG_{t-i} + \sum_{i=0}^q \epsilon_i \Delta LOPN_{t-i} + \sum_{i=0}^t \theta_i \Delta LFDI_{t-i} + \sum_{i=0}^w \pi_i \Delta LCPI_{t-i} + \beta_0 LGDP_{t-1} + \beta_1 LGFCF_{t-1} + \beta_2 LBPCG_{t-1} + \beta_3 LOPN_{t-1} + \beta_4 LFDI_{t-1} + \beta_5 LCPI_{t-1} + \gamma_1 DUM1 + \gamma_2 DUM2 + u_t \text{ ----- (5)}$$

where Δ is the first-difference operator, u_t is a white-noise disturbance term and all variables are expressed in natural logarithms with the symbol of Ln. The above final model also can be viewed as an ARDL of order, (p s r q t w). The model indicates that economic growth in terms of real GDP (GDP) per capita tends to be influenced and explained by its past values besides the other explanatory variables.

The structural lags are determined by using minimum Schwarz Bayesian criterion (SIC) due to small sample size. From the estimation of UECMs, the long-run elasticities are the coefficient of the one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of the one lagged dependent variable (Bardsen, 1989). For example, based on the final model above, the long-run GDP, GFCF, BPCG, OPN, FDI and CPI elasticities are (β_1 / β_0) , (β_2 / β_0) , (β_3 / β_0) , (β_4 / β_0) , and (β_5 / β_0) respectively. The short-run effects are captured by the coefficients of the first-differenced variables. After regression of Equation (5), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the concerned variables. The Wald test can be carried out by imposing restrictions on the estimated long-run coefficients.

The null and alternative hypotheses are as follows:

$$H_0 : \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \text{ (no long-run relationship)}$$

Against the alternative hypothesis

$$H_1 : \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0 \text{ (a long-run relationship exists)}$$

For a small sample size study ranging 30 observations and below, Pesaran, Shin, and Smith (2001) has tabulated two sets of appropriate critical values. One set assumes all variables are I(1) and another assumes that they are all I(0). This provides a bound covering all possible classifications of the variables into I(1) and I(0) or even fractionally integrated. If the *F*-statistic falls below the bound level, the null hypothesis cannot be rejected. On the other hand, if the *F*-statistic lies exceed upper bound level, the null hypothesis is rejected, which indicated the existence of cointegration. If, however, it falls within the band, the result is inconclusive.

The main purpose of this model is to verify the evidence of individual financial development and inflation towards the economic growth for the Malaysia country detects the positive relationship between financial development and inflation towards economic growth. Besides that, the model

also will test positive if financial development and inflation are associated with high levels of consumer price index, gross fixed capital formation, bank private credit, and openness ratio also for foreign direct investment are positively correlated with the GDP. An addition, Dummy 1 and Dummy 2 are added to capture financial crisis.

Source of Data

The data used in this research paper, which are real GDPC, GFCF, BPCG, OPN, CPI and FDI are collected from various sources such as International Financial Statistical Database from International Monetary Fund (IMF), World Development Indicators and Global Development Finance 2011 from World Bank and UNCTADSTAT database from United Nations Conference on Trade and Development (UNCTAD) that can be accessed freely from the internet. The sample data used is annual data starting from 1985 up to 2010, comprising 26 years which included several important events such as the period the Asian financial crisis erupted from 1997 to 1998, and global recession period from 2007 to 2008.

Explanation of Variables

I. Gross Domestic Product per capita (GDPC)

Gross Domestic Product (GDP) is gross domestic per capita in Malaysia. The GDP per capita is obtained by dividing the country's gross domestic product, adjusted by inflation and the total population.

II. Gross Fixed Capital Formation (GFCF)

Gross Fixed Capital Formation (GFCF) is a component of the expenditure on GDP and thus shows something about how much of the new value added in the economy is invested rather than consume. Gross Fixed Capital Formation (GFCF) is total value percentage of Gross Domestic Product (GDP) that captures the Financial Development.

III. Bank Private Credit to GDP (BPCG)

Bank Private Credit per GDP (BPCG) is total percentage of Bank Private Credit of the Gross Domestic Product (GDP). It is the variable used to proxy financial development growth in Malaysia.

IV. Openness Ratio (OPN)

Openness Ratio (OPN) is measured by summing export and import divided by GDP.

V. Consumer Price Index (CPI)

Consumer Price Index (CPI) is a measure that examines the weighted average of price of a basket of consumer goods and services such as transportation, food and medical care. Besides that, the Consumer Price Index (CPI) also will calculated by taking the price changes for each item in the predetermined basket of goods and averaging them. Meanwhile, changes in the CPI index are used to assess price changes associated with the cost of living.

VI. Foreign Direct Investment (FDI)

Foreign Direct Investment (FDI), direct investment into production or business in a country by a

company in another country. It is either by buying a company in the target country or by expanding operations of an existing business in that country. Foreign Direct Investment (FDI) also could contribute in merging economic growth in Malaysia.

Empirical Results and Discussion

The analysis begins with testing the unit root of every variable for Malaysia. Unit root test such as Dickey-Fuller (DF)/Augmented Dickey-Fuller (ADF) and the Phillip Perron (PP) test are carried out to determine the order of integration of the variables.

Based on DF and ADF, the results indicate that all variable shown a mix evidence for at level and first different. All of the variables are significant at level for both no trend and with trend except for foreign direct investment (FDI) where it is significant at level not trend with 5% significant level for no trend and stationary at level with trend with 10% significant level. For the first different, all variables are found to be stationary for both no trend and with trend. For level no trend, the result shows GDP, BPCG, GFCF and CPI at 5% significant level, while Openness Ratio (OPN) and Foreign Direct Investment (FDI) at 1% significant level. For the with trend all variable found Gross Domestic Product (GDP), Gross Fixed Capital Formation (GFCF) at 10% significant level, while for Openness ratio(OPN) and Foreign Direct Investment (FDI) at 5% significant level.

Unit roots test is once again tested by more powerful test known as Philipp Perron test (PP). The results revealed that all variables at level for both no trend and with trend are mostly not significant. However, based on first difference, the results show that all variables are significant. For the first different, all variable is found to be stationary for no trend at 1% significant level except Gross Fixed Capital Formation (GFCF) and Consumer Price Index (CPI) at 5% significant level. Meanwhile, for level with trend result shows, all variable is found to be stationary which are Bank Private Credit to GDP (BPCG), Openness Ratio (OPN) and Foreign Direct Investment (FDI) at 5% significant level, while Gross Fixed Capital Formation (GFCF) and Consumer Price Index (CPI) at 10% significant level. Therefore, the data meet the requirement to proceed by using Autoregressive Distributed Lags (ARDL) module as suggested by Pesaran Shin and Smith (2001)

Table 1: Unit Root Test

Country	DF/ADF Unit Root Test			
	Level		First Difference	
Malaysia	No Trend	With Trend	No Trend	With Trend
LGDP	0.107 (0)	-1.762 (3)	-3.487 (0)**	-3.411 (0)*
LBPCG	-1.317 (0)	-1.366 (0)	-3.972 (0)**	-2.611 (3)
LGFCF	-1.240 (1)	-2.802 (1)	-2.982 (0)**	-2.906 (0)*
LOPN	-1.478 (1)	-2.773 (1)	-3.759 (0)***	-3.757 (0)**
LFDI	-3.160 (1)**	-3.091 (1)*	-3.845 (0)***	-3.749 (0)**
LCPI	-0.616 (1)	-2.962 (1)	-3.115 (0)**	-3.041 (0)
PP Unit Root Test				
LGDP	0.033 (1)	-1.571 (2)	-3.511 (1)***	-3.435 (1)
LBPCG	-1.310 (3)	-1.509 (1)	-3.893 (6)***	-3.873 (7)**
LGFCF	-1.460 (2)	-2.185 (2)	-2.982 (0)**	-2.957 (1)*
LOPN	-0.874 (4)	-1.810 (2)	-3.682 (4)***	-3.667 (5)**
LFDI	-2.253 (0)	-2.198 (0)	-3.739 (8)***	-3.625 (3)**
LCPI	-0.030 (1)	-1.861 (1)	-3.119 (2)**	-3.030 (3)*

Note:(*),(**),(***) indicate significant at 10%,5% and 1% significance level respectively.
 Number in parentheses is standard errors

Detecting the Long Run Relationship

ARDL testing begins with testing the existence of long run relationship between the dependent variable and independent variables. Tables 2 above illustrates the result of F-statistics for Malaysia by setting the maximum lag equal to 4. Based on the result above, the computed F-statistics is found to be significant at 10% level for Malaysia as it F statistic value is larger than the upper bound, I(1). This condition has proven the existence of long run relationship between the variables which indicating of a steady-state long run relationship among GDP per capita, gross fixed capital formation, bank private credit to GDP, openness ratio, foreign direct investment and consumer price index. Therefore, the ECM version of the ARDL model is an efficient way in determining the long run relationship among the variables.

Table 2: F-Statistics for Testing the Existence of Long Run Equation

Model	Maximum lag	SIC-lag order	F Statistic
F _{GDP} (GDP/BPCG,GFCF,OPN,FDI,CPI)	4	(1,2,1,2,1,1)	3.431*
Critical Values for F-statistics#		Lower bound, I(0)	Upper bound, I(1)
k = 5	1%	3.41	4.68
	5%	2.62	3.79
	10%	2.26	3.35

Note: # The critical values are obtained from Narayan (2004), k is number of variables, critical values

for the bounds test: case III: unrestricted intercept and no trend. *, **, and *** represent 10%, 5% and 1% levels of significance, respectively.

Diagnostic Checking

Before the result was analysed, it is important to check the robustness of the model by adopting several diagnostic tests such as Breusch-Godfrey serial correlation LM test, ARCH test, Jacque-Bera normality test and Ramsey RESET specification test. All test showed that the model has the desired econometric properties, namely, it has a correct functional form and the model's residuals are serially uncorrelated, and homoscedastic given that the probability value of the t-test is all above than 10% significant value.

Table 3: Diagnostic Checking

Test	Value
Serial Correlation ^a	1.6704 (0.225)
Functional Form ^b	2.3269 (0.158)
Normality ^c	0.745 (0.325)
Heteroscedasticity ^d	0.3583 (0.555)

Note: (*),(**),(***) indicate significant at 10%,5% and 1% significant level respectively. ^a Langrange multiplier test of residual; ^bRamsey's RESET test using the square of the fitted values; ^cBased on a test of skewness and kurtosis of residuals; ^dBased on the regression of squared residuals on squared fitted values.

Short Run Dynamic and Long Run Elasticities

After detecting the long run relationship for Malaysia, we estimate both short run and long run model from equation (3) and the maximum order of lag chosen are 4 as suggested by Pesaran, Shin and Smith (2001). From this, the lag length that minimizes Schwarz Bayesian criterion is selected. The ARDL lag order detected for Malaysia is 1,2,1,2,1,1.

The dynamic short run causality among the variables tested were obtained by restricting the coefficient of the variables with its lags equal to zero by using the Wald test. If the null hypothesis of no causality is rejected, then it can be concluded that some selected variables used in this model (Granger) can cause the economic growth. From the test revealed in Table 4, all explanatory variables are statistically significant at 1% and 5% significant level. Besides, the significant ECM suggest that more than more than 0.40 of the disequilibrium caused by the previous shock will be corrected in the current year and converges back to the long run equilibrium for the country. As a summary, based on the findings of the short run causality test, it can be concluded that the hypothesis of inflation-led growth is still valid for the Malaysian economy as there appeared to be a positive relationship and short run causality running from the inflations to growth. There is a direct inflation effect on growth that is positive for low levels

of inflation and negative for high levels of inflation and the results on the inflation-growth relationship is not surprising.

The estimated coefficients of the long run relationship between economic growth (GDP) and the independent variables significant at 1% level for Consumer Price Index (CPI) and Openness Ratio (OPN), while for Bank Private Credit (BPCG), Foreign Direct Investment and Dummy 2 which significant at 5% level only. The result showed that the Openness Ratio (OPN) and Consumer Price Index (CPI) have a positive relationship with the GDP with estimated elasticities of 0.01 and 0.23 respectively. This shows that a 1% increase in Openness Ratio (OPN) and Consumer Price Index will result in 0.01 %, and 0.23 % increase in the country's GDP. The result shows inflation led economic to grow stronger as compared to financial development as shown by past findings such as Mohsin, Khan and Abdelhak S. Senhad (2001), and John H. Boyd et al. (2000). The validity of Inflation led growth theory in Malaysia is also consistent with the previous study done by A.Phiri (2010). Therefore, the detection of positive relation in ARDL bound test between inflation and gross domestic product (GDP) confirm the idea of inflation led economic growth is greater for Malaysia compared to financial development.

Table 4: Short Run Analysis and Long Run Elasticities

Short Run Analysis		Long Run Elasticities	
Dependent variable: D(LGDP)	ARDL	Dependent variable: LGDP*	ARDL
Constant	2.4748 (0.6912)***	Constant	6.2852 (0.2159)***
ECT _{t-1}	-0.3976 (0.1066)***	LBPCG	0.1869 (0.0725)**
DLGFCF	0.2178 (0.0313)***	LGFCF	0.0379 (0.0423)
DLGFCF _{t-1}	-1.0119 (0.0330)***	LOPN	0.0124 (0.0019)***
DLBPCG	-0.0749 (0.0174)***	LFDI	-0.0675 (0.0285)**
DLOPN	-0.1228 (0.0300)***	LCPI	0.2256 (0.0733)***
DLOPN _{t-1}	-0.1500 (0.0292)**	DUM1	-0.0196 (0.0255)
DLFDI	-0.0347 (0.0168)**	DUM2	-0.0846 (0.0317)**
DLCPI	0.0063 (0.0017)***		
DDUM1	-0.0160 (0.0159)		
DDUM1 _{t-1}	-0.0274 (0.0171)		
DDUM2	0.0140 (0.0114)		

Note: (*),(**),(***) indicate significant at 10%,5% and 1% significance level respectively.

Number in parentheses is standard errors

Conclusion and Policy Recommendation

This paper highlights the impacts of inflation and financial development towards Malaysia economic growth. The overall findings showed that, in the long run, higher inflation, deepening in financial development, and increase in country's openness could lead towards higher economic growth in the country. Meanwhile, the short run economic growth is a positively and significantly affected by changes in consumer price index that measure the inflation led growth. Furthermore, changes in financial development exerted positive (negative) impact on growth. From this previous finding suggest that Asian Financial Crisis of 1997 have not changed the relationship much, though the causal relationship between financial development show a minor change due to the 1997 crisis (Indrani Chakraborty, 2011). Moreover, we also found that the hypothesis of inflation led growth in the Malaysian economy is also seen both short run and long run from the previous researchers such as Kanchan Data and Chandan Kumar Mukhopadhyay (2011), Manoel Bittencourt (2008), Mohsin S. Khan and Abdelhak S. Senhad (2001), John H. Boyd, Ross Levine and Bruce D. Smith (2000).

As for policy recommendation, since consumer price index (CPI) is one of the major determinants for Malaysian economy, the government should consistently be monitoring the level of the inflation rate which has been found helpful for the achievement of sustainable economic growth. Moderate and stable inflation is also helpful for minimizing the fluctuations and uncertainties in the financial sector of economy, which, in turn, boost the capital formation activities in the country. So, it may exert its positive effects on the economy. So, maintaining price stability through the effectiveness of fiscal and monetary policies to curb the problem of inflations will ultimately be the best policy recommendation to stable and sustained economic growth of the economy.

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