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Islamic Banking-Growth Nexus: Evidence from Toda-Yamamoto and Bootstrap Granger Causality Test

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Abstract

This paper examines the causal relationship between Islamic banking development and economic growth and between Islamic banking development and capital formation in the case of Malaysia. Different with other studies, this paper uses Toda-Yamamoto and bootstrap granger non-causality test to reduce the size distortion in the data and provide more precise test inference than the commonly used asymptotic method especially in the case of small sample size. The results demonstrate a significant Granger causality from Islamic financial development to economic growth but the converse is not true, which supports the Schumpeter's supply-leading view. The empirical evidence indicates further development of Islamic finance will contribute to the economic growth in the case of Malaysia.

Keywords: Granger non-causality, Islamic banking, economic growth, Toda-Yamamoto, bootstrap.

1. Introduction

Research works in the field of finance-growth nexus have been extensively done by many financial economists. As a result, there are at least three types of causal relationships found between financial development and economic growth i.e. supply-leading, demand-following, and bi-directional causal relationships. Patrick (1966) explains that supply-leading relationship is the creation of financial institutions and instruments in advance of demand for them in an effort to stimulate economic growth. This strategy seeks to make allocation of capital more efficient and to provide incentives for growth through the financial system. On the other hand, demand-following relationship appears as a consequence of the development of the real sector. This implies a continuous widening of markets and a growing product differentiation which makes necessary more efficient risk diversifications as well as better control of transaction cost (Hermes and Lensink, 1996).

However, out of the extensive number of researches carried out in this field, literatures are still lacking when it goes to the Islamic finance-growth nexus. Therefore, this paper is aimed at narrowing the literature gap in the discussion of the role of Islamic banking towards economic growth. Moreover, to provide a more robust result as compared to previous studies done in the same field, this study utilizes Toda-Yamamoto and granger non-causality test with bootstrap algorithm.

2. Literature Review

2.1. Conventional Finance and Economic Growth

Among the seminal works in this field are studies done by McKinnon (1973), Shaw (1973), King and Levine (1993), Demetriades and Hussein (1996), Levine et al. (2000), Beck et al. (2000), Beck and Levine (2004), and recently Shen and Lee (2006). To provide evidence of the role of financial development

towards economic development of a country, King and Levine (1993) has constructed four indicators of the level of financial sector developments i.e. financial depth, the relative importance financial institution, credit to private enterprises, claims on the non-financial private sector to GDP; which are regressed with the real GDP per capita and its sources and utilized data from 80 countries over the 1960-1989 periods. The study concluded to support the Schumpeter's view that the financial development promotes economic growth. Gregorio and Guidotti (1995) and Calderón and Liu (2002) found the same evidence and derived the same conclusion with King and Levine (1993). Another study by Beck and Levine (2004) investigates the impact of stock markets and banks on economic growth using a panel data set for the period 1976–1998. The results strongly reject the notion that overall financial development is unimportant or harmful for economic growth. Therefore, they argue that stock markets and banks positively influence economic growth.

Some studies have taken a more microeconomic approach and some used stock markets as the proxy for financial development. For example, Fisman and Love (2003) revisited an earlier paper by Rajan and Zingales (1998) by re-examining their assumptions, and the robustness of their results to alternative theories and interpretations. The result is supporting the hypothesis that financial development helps industries with good growth opportunities. It also reinforces their hypothesis that the role of financial development is to reallocate resources to industries that have good growth opportunities and not to industries with "technological dependence" on external finance.

Interestingly, Demetriades and Hussein (1996) found evidence of reverse causation so that the relationship between financial development and growth appears to be bi-directional. Demetriades and Hussein (1996) reviewed previous studies in financial development and economic growth which combines many countries without classifying them into some appropriate groups. They studied 16 countries from all around the world and classified them based on the following criteria; the country (i) must not be highly developed in 1960, (ii) has at least 27 continuous annual observations on the variables of interest and (iii) its population must exceed 1 million in 1990.

On another occasion, Deidda and Fattouh (2002) and Rioja and Valev (2002) found that there is no significant relationship between financial depth and economic growth in countries with low income per capita. However, the significant relationship appears in the high income countries.

2.2. Islamic Finance and Economic Growth

With regard to the role of Islamic financial development in economic growth, there are still limited articles in this area. There are at least four studies focused on this issue i.e. Furqani and Mulyany (2009) and Majid and Kassim (2010) for the case of Malaysia, Abduh and Omar (2012) for the case of Indonesia, and Abduh and Chowdhury (2012) for the case of Bangladesh.

Interestingly, using not-so-different time span of quarterly data, the findings from Furqani and Mulyany (2009) and Majid and Kassim (2010) are different in terms of the direction of the relationship. Furqani and Mulyany (2009), on the one hand, posit that the relationship between Islamic financial development and economic growth is following the view of "demand-following" which means that economic growth causes Islamic banking institutions to change and develop. Majid and Kassim (2010), on the other hand, concluded that the relationship is supporting the supply-leading view.

Using quarterly data (2003:1-2010:2), Abduh and Omar (2012) utilized the bound testing approach of cointegration and error correction models, developed within the autoregressive distributed lag (ARDL) framework to find the causal relationship between Islamic financial development and Indonesia economic growth. The results demonstrated a significant relationship in short-run and long-run periods between Islamic financial development and economic growth. The relationship, however, is neither Schumpeter's supply-leading nor Robinson's demand-following. It appears to be bi-directional relationship. In this regard, domestic financing provided by Islamic banking sector has been found to contribute to the growth of the Indonesian economy and at the same time, growth propels Islamic banking development in Indonesia. This conclusion is similar with Abduh and Chowdhury (2012) which tested the direct relationship between total deposit and total financing of Islamic banking industry in Bangladesh towards their economic growth using quarterly time series data which span from Q1:2004 to Q2:2011. Using

cointegration methodology, the results had shown that Islamic bank financing has shared long run positive relationship with economic growth and the direction appears to be bidirectional relationship.

Departed from the limited number of studies done in the Islamic financial framework; this paper is aimed at narrowing the literature gap in the discussion of the role of Islamic banking towards economic growth, particularly in Malaysia. Moreover, to provide a more robust result as compared to previous studies done in the same field, this study utilizes different methods from the previous studies in Malaysia i.e. Toda-Yamamoto cointegration and granger non-causality test with bootstrap algorithm, and is expected to provide a deeper analysis.

3. Data and methodology

3.1. Data

Quarterly data on real GDP, real gross fixed capital formation and real Islamic bank's total financing are retrieved from IMF's International Financial Statistics (CD-ROM). The data duration for is from 1998Q1 to 2012Q2. All the time series are transformed into logarithms. The logarithms of real GDP, denoted as y, the real fixed gross capital formation, denoted as k, and the Islamic bank's total financing, denoted as f.

3.2. The Multivariate Granger Causality Test

In contrast to previous studies, this paper uses trivariate system in order to avoid possible model mis-speciation problem. It tests the causal dynamic among growth, Islamic banking development and gross capital formulation. The most common way to test the causal relationships between two variables is the Granger-Causality proposed by Granger (1969). For instance, a three variable vector autoregression (VAR) model in testing granger non-causality takes the following form:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \\ x_{3t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \\ A_{30} \end{bmatrix} + \begin{bmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{23}(L) & A_{33}(L) \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \\ x_{3t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix} \quad (1)$$

where it is assumed that the disturbances e_{it} are uncorrelated. A_{io} are the intercept terms and $A_{ij}(L)$ are the polynomials in the lag operator$L$. The individual coefficients of $A_{ij}(L)$ are denoted by a_{ij} (1), $a_{ij}(2), \cdots$. In this case, variable j does not Granger cause variable i if all coefficients of the polynomial $A_{ij}(L)$ can be set equal to zero. For instance, if all coefficients of the polynomial $A_{12}(L)$ are set to be equal to zero, then x_{2t} does not Granger cause x_{1t}. The test can be based on standard Wald test based on asymptotic distribution theory.

It is well established that many macroeconomic variables are integrated of order one, I(1). This situation could exemplify the problem of spurious regression if we still use (1) and the standard asymptotic approach turned out to be an improper approach to verify the causality. As remedy to this problem, a vector error correction model (VECM) is the alternative approach as proposed by Granger (1988).

Engle and Granger (1987) and Granger (1988) have demonstrated that Granger causality must exist in an error-correction model (ECM).Although theoretically VECM is a useful tool for testing for causality in cointegrated VAR systems, the complicated pretesting procedure, however, turned out to be a serious difficulty in empirical applications. The VECM approach for Granger non-causality test involves transforming the suggested relationship into an Error Correction model (ECM) and identifies the parameters associated with causality. If the case involves more than two cointegration vectors, this is not easy work. Yet there is growing concern among applied researchers that the cointegration likelihood ratio (LR) test of Johansen and Juselius (1990) have often not provide the degree of empirical support that might reasonably have been expected for a long run relationship. Furthermore, using a Monte Carlo experiment, Bewley and Yang (1997) argue that the power of LR tests is high only when the correlation between the shocks that generate the stationary and non-stationary components of typical macroeconomic series is sufficiently large and also that the power of LR tests deteriorates rapidly with over-specification of lag length. This concern has also been supported by the simulation studies of Ho and Sorensen (1996).

Clarke &Mirza (2006) points that the practice of pretesting for cointegration can result in severe over rejections of the non-causal null, whereas over fitting [the Toda and Yamamoto (1995) methodology] results in better control of the Type I error probability with often little loss in power (Clarke &Mirza, 2006, p.207.).

Furthermore, Cheung and Lai (1993) point out that Johansens's test is biased toward finding cointegration between variables if the test's finite sample critical values are not applied. Since cointegration is easy to hold for I(1) variables and Granger causality must exist in an ECM, there is thus a reasonable doubt that the Granger causality test might be biased toward rejecting the non- causality null for even arbitrary integrated data.

Toda and Phillips (1993) also provide evidence that the Granger causality tests in ECMs still contain the possibility of incorrect inference and suffer from nuisance parameter dependency asymptotically in some cases (see Toda and Phillips, 1993 for details). Therefore, their results are unreliable. All of these indicate that there may be no satisfactory statistical basis for using Granger causality tests in levels or in difference VAR system or even in ECM.

To overcome the complexity of pre-testing, another approach was proposed by Toda and Yamamoto (1995). This approach ensures that asymptotic distribution theory is valid for VAR systems, regardless of the order of integration of considered variables orthe dimension of cointegration space. Furthermore, the important advantage of this method is its simplicity since it is just a small modification of the standard Wald test. The absence of pretesting bias made this procedure one of the most widely applied approaches in recent empirical economic research.

Two steps are involved in implementing the Toda and Yamamoto (1995) procedure. The first step includes determination of the true lag length of k and the maximum order of integration ($\mathrm{d}_{\max}$) of the variables in the system and a ($k + d_{max}$)th order VAR is then estimated. The second step is to apply standard Wald tests to the first kth VAR coefficient matrix only in order to conduct inference on Granger non-causality[*]. It uses a modified Wald (MWALD) test to test for restrictions on the parameters of the VAR(k) model. This test has an asymptotic chi-squared distribution with k degrees of freedom in the limit when a VAR [k+dmax)] is estimated. Moreover, according to Toda and Yamamoto (1995), the MWald statistic is valid regardless whether a series is I(0), I(1) or I(2), non-cointegrated or cointegrated of an arbitrary order. Thus the procedure proposed by Toda and Yamamoto (1995) not only avoids integration and complexity but also improve the power of the Granger-Causality test.

3.3. The Bootstrap Test Algorithm

Although the Toda-Yamamoto approach is easy to implement, this approach is also likely to fail when some standard assumptions do not hold (especially concerning the distribution of error term). Application of the bootstrap approach may often provide better results since bootstrapping does not strictly depend on model specification (for more details on bootstrap see Efron (1979)). Dolado and Lütkepohl (1996) has shown that in high dimensional vars with a small true lag length the significant reduction of power of the considered causality test may occur, especially for small samples. Simulation exercises by Mantalos (2000) indicated that the standard asymptotic approach may often lead to significant size distortion. Application of the residual-based bootstrap technique usually improves the size and power performance of causality tests. Another simulation study by Hacker and Hatemi (2006) indicated that the bootstrap technique performed relatively well in all cases. Zapata and Rambaldi (1997) found that the Toda and Yamamoto (1995) Wald test is clearly preferred to the likelihood ratio test used in the context of a VECM model, unless the sample size is *extremely* small.

It is well known that giving the short history of Islamic banking service, long span data on Islamic banking is not available. Given the small sample size the distribution assumption may not hold in this case. Thus we extend the study by using a bootstrapping Granger non-causality test. The bootstrap procedure estimates the distribution of a test statistic based on re-sampling the underlying data. It is hoped that the bootstrap-derived distribution provides more precise critical values and thus, leads to less bias in

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[*] Notice that the additional lag (d) are unrestricted, their function is to ensure the asymptotical critical values can be applied when test for causality between integrated variables are conducted.

statistical inference. To the knowledge of the author, this kind study that use Toda and Yamamoto (1995) in both asymptotic and bootstrap variant have not been published so far.

The Bootstrap algorithm of the Granger causality test consists of the following steps:

Step 1. Given the original data observation, we estimate the coefficients by the estimated generalized least square method for VAR model (1) under H0 and H1, respectively, and calculate the residuals for each equation respectively.

Step 2. Generate bootstrap sample of these residuals. Use the bootstrap sample to generate the bootstrapped *y* series under the null hypothesis using the coefficients estimated in step 1.

Step 3. Perform the Granger non-causality test on the re-sampled data and book-keeping the significance level.

Step 4. Repeat Step 2 and Step 3 for 10,000 times.

Using the 10,000 test statics obtained from the bootstrapped replication in step 3 to determine the p-value for the Granger non-causality test.

4. Empirical result

Before employing the Granger causality test, the unit root and model selection criteria are necessary to test to select d_{max} and k, respectively.Two alternative popular unit root tests are performed on these time series. First, we applied the Augmented Dickey Fuller (ADF) test by Dickey and Fuller (1979), which is the benchmark test. As complementary, we use the KPSS test proposed by Kwiatkowski, Phillips, Schmidt and Shin (1992) to double-check the time series properties of the data. The KPSS test considers the null hypothesis of a stationary series against the alternative of a unit root. Table 1 reveals that the series are mixture of I(0) and I(1).

The order of the VAR model often plays a crucial role in empirical analysis and hence special care should be taken in selecting the optimal lag length. To this end, the optimal lag is determined by the Sequential modified LR test statistic. The LR criteria suggest that we should have a maximum lag length of 3 for in this case. However, when we then examine the residuals and apply the LM test for serial independence against the alternative of AR(k)/MA(k), for k = 1, ..., 12, we find that there are problems. This serial correlation is removed (at least at the 5% sig. level) if we increase the maximum lag length to p = 4. †

Table 1. ADF and KPSS Unit Root Tests Results

Time series	ADF		KPSS	
	Level	1st Difference	Level	1st Difference
Real GDP (y)	-3.489*	-5.130***	0.159*	0.481
Fix Gross Capital formation (k)	-5.215***	-6.211***	0.105	0.102
Islamic Financing (f)	-1.507	-7.965***	0.204**	0.102

Notes: The lag lengths are selected according SIC (Schwartz information criterion) rule. The critical values for the ADF tests are based on MacKinnon (1996) and for KPSS are based on Kwiatkowski, Phillips, Schmidt and Shin (1992, Table 1). ***, ** and * denotes significant at 1%, 5% and 10% levels, respectively.

Table 2 summarizes *p*-values of the Modified Wald test statistics in Ganger non-causality test based on the standard asymptotic distribution. Table 2 shows that that at 1% level of significance the null hypothesis that Islamic banking development does not cause economic growth can be rejected. However, this paper fails to reject null hypothesis that economic growth does not cause Islamic banking development. This paper also find that the null hypothesis of economics growth does not Granger cause capital formation at 5% level of significance but the converse is not true. It also found that neither Islamic

† When testing for normality, the results indicated some slight departure from normality. This will not affect the bootstrap based causality test however, since it is based on the true distribution of the underlying data, which does not necessarily have to be normally distributed.

banking development Granger cause capital formation nor capital formation cause Islamic banking development. These findingsarecontradicted to Furqani and Mulyany (2009), they documents that 'there is a uni-directional [Granger] causality between Islamic Bank financing' and investment and economic development Granger cause Islamic bank development (Furqani and Mulyani, 2009, p 69). Since Islamic financing activities are more towards to real economic activity and promote real investment, our results are somehow does not in line with this intuition.

Table 2. Multivariate Granger Causality Test Results

p-value for the Asymptotic Test Statistics			
	Source of Causation		
	y	*k*	*f*
y	-	0.1657	0.0003***
k	0.0144**	-	0.1719
f	0.6663	0.9589	-

Notes: ***, ** And * Indicate significance at the 1%, 5% and 10 % respectively.

Table 3. Multivariate Granger Causality Test Results

p-value for the Bootstrap Test Statistics			
	Source of Causation		
	y	*k*	*f*
y	-	0.014**	0.026**
k	0.0241**	-	0.3092
f	0.3773	0.3632	-

Notes: ***, ** And * Indicate significance at the 1%, 5% and 10 % respectively.

Table 3 summarizes *p*-values of the test statistics in Ganger non-causality test based n the empirical bootstrap distribution. Table 3 shows that the null hypothesis of Islamic financing does not Granger cause economic growth, however, the evidence running from Islamic financing to the economic growth is weaker (at 5% level of significance) than what can be seen in Table 2. Other results are basically remain the same as Table 2 except that the causal relationship between economic and investment. The bootstrap p-value indicates that there is a bi-directional causality between economic growth and investment at 5% level of significance.

5. Conclusion

The relationship between financial development and economics growth has attracted widespread attention in the past few decades and there has been a larger volume of studies on this area. As alternative to the conventional baking and finance, Islamic finance has experienced remarkable growth over the last three decades and the global demand for financial products and services that comply with the financial principles of Islam increasing day by day. It is believed that due to its unique properties, Islamic Banking supposed to influence the economic growth in real terms. However, little empirical studies are available in this regards. Therefore, this study investigates the causal relationship between Islamic financial development and economic growth in the context of Malaysia using data from 1998Q1 to 2012Q2. Giving the short comings of previous studies, this study employ the Toda and Yamamoto Wald test because this test is preferred to the likelihood ratio test used in the context of a VECM model. Knowing that the asymptotic distribution statistic may lead insufficient inference to provide more precise inference, a bootstrap Granger causality is used exam the causal relationships between Islamic financing and economic growth. The results from the Toda and Yamamoto Wald test indicate that Islamic financing Granger cause economic growth but the converse is not true. This result is consistent with Schumpeter's view that the financial development promotes economic growth, support the so called supply-leading hypothesis.

However, giving the limed sample size, the Granger causality study is very likely to lead to the size distortion in the test results because the sample size of the data for Islamic financing is small. This paper further employs the bootstrap method to re-evaluate the evidence of the causality relationship between Islamic financing and Economic growth. The bootstrap test results show that the evidence of Granger causality from Islamic financing to Economic growth is not as significant as the existing evidence from the asymptotic method such as Toda and Yamamoto Wald test. However, the results are very encouraging and indicating that continuous effort given to further develop the Islamic financial sector will contribute to economic growth.

References

Abduh, M. and Omar, M. Azmi. (2012). "Islamic banking and economic growth: the Indonesian experience," *International Journal of Islamic and Middle Eastern Finance and Management*, 5(1), 35-47.

Abduh, Muhamad and Chowdhury, N.T. (2012). "Islamic Banking – Economic Growth Nexus: Evidence from Bangladesh", *Journal of Islamic Economics, Banking and Finance*, 8(3), 104-113.

Beck, Thorsten and Levine, Ross. (2004). "Stock markets, banks, and growth: panel evidence", *Journal of Banking and Finance*, 28, 423-442.

Beck, Thorsten., Levine, Ross., and Loayza, Norman. (2000)."Finance and the sources of growth", *Journal of Financial Economics*, 58, 261-300.

Bewley, R. and M. Yang (1997),"On the size and power of cointegration tests", *Review of Economics and Statistics*, Nov., 675-679

Calderón, César and Liu, Lin. (2002). "The direction of causality between financial development and economic growth", Working Paper No.184, Central Bank of Chile.

Cheung, Y.-W.and K. S. Lai. (1993). "Finite-sample sizes of Johansen's likelihood ration tests for cointegration," *Oxford Bulletin of Economics and Statistics*, **55**, 313-328.

Clarke, J. A. and S. Mirza, (2006), "A comparison of some common methods for detecting Granger noncausality." *Journal of Statistical Computation and Simulation*, 76, 207-231.

Deidda, Luca and Fattouh, Bassam. (2002). "Non-linearity between finance and growth", *Economics Letters*, 74,339-345.

Demetriades, Panicos O and Hussein, Khaled A. (1996). "Does financial development cause economic growth? Time series evidence from 16 countries", *Journal of Development Economics*, 51, 387-411.

Dickey, D.A. and Fuller, W.A. (1979). "Distribution of the Estimation for Autoregressive Time series with a Unit Root", *Journal of American Statistical Association*, 79, 355-367.

Dolado, J. J., and H. Lütkepohl.(1996), "Making Wald tests work for cointegratedvar systems". E*conometrics Reviews* 15 (4), 369–86.

Efron, B. (1979). "Bootstrap methods: Another look at the Jacknife." *Annals of Statistics* 7 (1), 1–26.

Engle, R. F. and Granger, C.W.J. (1987). "Cointegration and error correction regression: estimation and testing", *Econometrica*, 55(2), 251-76.

Engle, Robert F. and CliveW. J. Granger, (1987), "Co-integration and Error Correction: Representation,Estimation, and Testing"," *Econometrica*, 55, 251–76.

Fisman, Raymond and Love, Inessa. (2003). "Financial dependence and growth revisited", NBER Working Paper, No. 9582.

Furqani, Hafas and Mulyany, Ratna. (2009). "Islamic banking and economic growth: Empirical evidence from Malaysia", *Journal of Economic Cooperation and Development*, 30(2), 59-74.

Granger, C.W. J. (1988), "Some recent developments in the concept of causality". *Journal of Econometrics*, 39 (1–2), 199–211.

Granger,C.W.J. (1969). "Investigating causal relations by econometric models and cross-spectral methods." *Econometrica* 37 (3), 424–38.

Gregorio, Jose De and Guidotti, Pablo E. (1995). "Financial development and economic growth", *World Development*, 23(3), 433-448.

Hacker, R. S., andA.Hatemi-J.(2006), "Tests for causality between integratedvariables using asymptotic and bootstrap distributions: theory and application". *Applied Economics* 38 (13), 1489–500.

Hermes, Niels and Lensink, Robert. (1996). *Financial development and economic growth: theory and experiences from developing countries*, Routledge, New York.

Ho, M. S. and B. E. Sørensen. (1996), "Finding Cointegration Rank in High Dimensional Systems Using the Johansen Test: An Illustration Using Data Based on Monte Carlo Simulations", Review of Economics and Statistics. 78(4): 726-732.

Johansen, S. (1988). "Statistical analysis of cointegration vector", *Journal of Economics Dynamics and Control*, 12, 231-254.

Johansen, S. and Juselius, K (1990), "Maximum Likelihood Estimation and Inference on Cointegration - With Applications to the Demand for Money". *Oxford Bulletin of Economics and Statistics* 52, 169-210.

King, Robert G and Levine, Ross. (1993). "Finance and growth: Schumpeter might be right", *The Quarterly Journal of Economics*, 108(3), 717-737.

Kwiatkowski, D., Phillips, P. C. B., Schmits, P., and Shin, Y. (1992), "Testing the null hypothesis of stationaryagainst the alternative of a unit root: How sure we that economic time series have a unit root?" *Journal ofEconometrics*, 54, 159-178.

Levine, Ross.,Loayza, Norman., and Beck, Thorsten. (2000). "Financial intermediation and growth: causality and causes", *Journal of Monetary Economics*, 46, 31-77.

Majid, Shabri A. and Kassim, Salina. (2010). "Islamic finance and economic growth: The Malaysian experience". Paper presented in Kuala Lumpur Islamic Finance Forum, Kuala Lumpur, 2-5 August 2010.

Mantalos, P. 2000. "A graphical investigation of the size and power of theGranger-causality tests in integrated-cointegrated var systems". *Studiesin Nonlinear Dynamics & Econometrics* 4 (1), article 2.

McKinnon, R. I. (1973). *Money and capital in economic development*, Washington, DC: Brooking Institution.

Patrick, Hugh T. (1966). "Financial development and economic growth in developing countries", *Economic Development and Cultural Change*, 14(2), 174-189.

Rioja, Felix and Valev, Neven. (2002). "Finance and the sources of growth at various stages of economic development", Working Paper 02-17, Andrew Young School of Policy Study, Georgia State University.

Shaw, Edward. (1973). *Financial deepening in economic development*, Oxford University Press.

Shen, Chung-Hua and Lee, Chien Chiang. (2006). "Same financial development yet different economic growth—Why?" ,*Journal of Money, Credit, and Banking*, 38(7), 1907-1944.

Toda, H. Y. and Phillips, P. (1993)."Vector auto regressions and causality," *Econometrica*, 61, 1367-1393.

Toda, H. Y. and Yamamoto, T. (1995)."Statistical Inference in Vector Auto regressions with Possibly Integrated Processes", *Journal of Econometrics*, 66, 225-250.

Todaro, P. and Smith, S. C. (2003).*Economic Development*, Eighth Edition, Addison Wesley, Singapore

Zapata, H. O. and Rambaldi, A. N. (1997). "Monte Carlo Evidence on Cointegration and Causation," *Oxford Bulletin of Economics and Statistics*, 59(2), 285-298.