Financial development and growth: Causality analysis for South East Asian Countries (Short and Long run relationship)

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Abstract

This paper tries to examine the causal direction between financial development and growth for South East Asian countries by using the Granger Causality Wald test. The long run and short run causality was examined by using Johnson co-integration test and Granger ECM procedure for the period 1970 to 2006 on annual basis. To perform this analysis we employ five indicator of financial development while the economic growth has been measured by real GDP. In the case of South East Asian countries we find that bi-causality exists between financial development and economic growth for the variables financial intermediation and stock market development. Multivariate causality flows from financial development to economic growth for all the countries. The causality from financial development variables to economic growth has been seen for all the four countries. The financial development indicator financial intermediation is showing unique relationship for all the countries except Malaysia. The banking sector development indicator show unique relationship in the case of Indonesia and Korea where as non-unique relationship for the countries Thailand and Malaysia. For the indicator private credit to GDP ratio, a unique relationship is found in the case of Malaysia and non-unique for Korea and Indonesia. The stock market development is showing unique relationship in the case of Indonesia and Korea and non-unique relationship for the countries Malaysia and Thailand. So far as multivariate co-integration is concerned, all the countries are showing the non-unique relationship from financial development to economic growth indicators. In case of panel data it is found that short run causality from financial development to economic growth and short run as well as long run causality in the reverse direction.

Introduction

TThe direction of causality between financial development and economic growth has always been controversial issue. Robinson (1952) argued that financial development is merely a by-product or an outcome of growth in the real economy. The issue was not much investigated till 1955. In 1955 Gurley and Shaw posited a unidirectional relationship between the financial development and growth with no significant feedback from economic growth to financial development. Goldsmith (1969) also supported the supply-leading hypothesis by arguing that financial development propels growth by improving the productivity of capital. More importantly, Goldsmith believed that there are some feed back effects as economic growth provides greater incentives for financial development. Since the seminal works of Patrick (1966), which first of all postulated a bi-directional relationship between financial development and economic growth, a large empirical literature has emerged testing this hypothesis. McKinnon and Shaw posited that financial development fuels economic growth via three channels by high levels of saving, investment as well as improved productivity of capital. The emergence of the new theories of endogeneous economic growth (Romer 1986,1990) has given a new impetus to the relationship between growth and financial development, as these models postulate that savings behaviour directly influences not only equilibrium income levels but also growth rates (Greenwood and Jovanovic, 1990) and Benecivenga and Smith, 1991). Thus financial markets can have a strong impact on real economic activity. Indeed Hermes (1994) argues that financial liberalization theory and the new growth theories basically assume that financial development leads to economic growth.

On the other hand, Murinde and Eng (1994) and Luintal and Khan (1999) argued that a number of endogenous growth models show a two-way relationship between financial development and economic growth. It is apparent therefore that the debate on the direction of causality between financial development and economic growth remains, despite the emergence of new growth theories. The causality between financial development and economic growth is still a controversial issue. King and Levine (1993) reports that higher levels of financial development are significantly correlated with economic growth. They conclude that finance leads to economic growth.

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The direction of causality between financial development and economic growth may run both ways. Finance may cause economic growth and economic growth may cause financial development. Economic growth may create a demand for financial intermediation and hence the financial system will grow in response to economic development. In this chapter we try to assess the causal direction between financial development and economic growth. For knowing the direction we need to test causality through Granger test. Thereafter we apply the co-integration technique proposed by Johansen and Juselius (1992) to examine whether a long run relationship exists or not. The cointegration methodology tests the long run equilibrium relationship between financial development and economic growth.

This would shed light on the much-debated question of whether financial development Granger causes sense economic growth. or vice versa. We also used the Granger causality Wald test to study the multivariate causality between financial development and economic growth.

Data Sources and Period of Study

We use time series data to test the relationship between financial development and economic growth. Our variables are: (a) the growth rate of real GDP per capita (GRGDPC), which measures economic growth. (b) The effect of financial intermediation development on economic growth is measured by ratio of broad money stock (M2) to GDP ratio (LQGDP); this also captures the overall size of the formal financial intermediary sector. This is a typical indicator of financial depth (King and Levine 1993(a)). (c) We use private credit, which equals bank claims on the private sector divided by GDP (PCGDP) to indicate the share of credit funneled through the private sector. (d) we use the ratio of bank domestic assets to total assets of bank (DMBATA) and the central bank measuring the degree to which commercial banks or the central banks allocate the society's savings (Beck et al (2000)). (e) to evaluate the effect of stock market development on economic growth, we construct stock market capitalization ratio, which equals the ratio of the market value of listed shares to GDP (SMCGDP). This is a typical measure of stock market size. We use annual data for the period 1970 to 2006. In this paper we are trying to examine the short run and long run causal relationship in bi-variate and multivariate environment. Granger causality Wald test has been used to examine bi-variate causality and multiivariate causality. The multivariate causality has been examine from economic growth to financial development as we are taking four indicators of financial development and one indicators of economic growth. To examine the long run relationship we conducted co-integration analysis.

Methodology

We have already performed unit root tests before undertaking the causality tests If a variable is found to have a unit root, we include the first difference of the variable in our causality tests only if the first difference is found to be stationary. The Dickey - Fuller tests indicated that all the variable were integrated of order I(0) and I(1). Granger causality test for integrated variable assumes the form:

$$\Delta yt = \alpha + \sum_{i=1}^{n} \beta i \Delta Yt-i + \sum_{j=1}^{m} Yj \Delta Xt-j + \phi \varepsilon t-1 + Ut \qquad (1)$$

Where εt-1 is the error correction mechanism (ECM) lagged in one period that is derived from the long run equation:

$$yt = \psi xt + \varepsilon t \qquad (2)$$

To reject the null hypothesis that x Granger causes y, it is necessary not to reject that Σj-1 m YtΔxt-j = 0 (what can be verified by F test). In addition, it is required statistically insignificance of the error correction mechanism (ECM). For stationary variables, equation (1) was regressed in levels (and not in differences) and the ECM term does not appear.

The next step is to test for co-integration if the variables are non-stationary in their levels. Generally a set of variable is said to be co-integrated if a linear combination of the individual series, which are I(d), is stationary, Intuitively, if Xt ~ I(d) and Yt ~ I(d), a regression is run such as :

$$Yt = \beta Xt + \epsilon t$$

If the residuals, €t are I(0), then Xt and Yt are cointegrated. We use Johansen's (1988) approach which allows as to estimate and test for the presence of multiple cointegration relationships, r, in a single step procedure. The tests for co-integration are based on a VAR framework, as initiated by Johansen (1988). In this paper, we use a bVAR (two-variable VAR case), where the co-integration test is for the null hypothesis H0 that there is no co-integration between the variables, against the alternative hypothesis Ha that there is only one co-integrating vector. Determining the number of cointegrating vectors: Johansen and Juselius describe two likelihood ratio tests: (a) a test based on the maximum eigen value wherein the null hypothesis tested is that there are at the most r co-integrating vectors; and (b) test based on the trace of the stochastic matrix wherein the null hypothesis tested is that there are at least 'r' or more co-integrating vectors. To implement these tests, the VAR lag length has to be decided upon. If co-integration between the variable exists at the level then we have to look for causality between

first differences to ascertains the causal relationship.

Granger Causality Wald test.

In the Wald test a joint hypothesis, such as H0:□ 2 =c¬2, □3=c3 , the test may be based on the Chi-Square distribution with the number of degrees of freedom equal to the number of hypothesis (J) being used. The test itself may be called a Wald test. In the Granger Causality Wald test variable A is said to Granger cause variable B, if the lags of A can improve a forecast for variable B. In a VAR model, under the null hypothesis variable A does not Granger causes variable B, all the coefficients on the lags of variable A will be zero in the equation for variable B. A wald test is commonly used to test for Granger causality. Each row of the table reports a Wald test that the coefficients on the lags of the variable in the "excluded" column are zero in the equation for the variable in the "equation" column.

Estimation and Results
South East Asian Countries

First we have performed the unit root test to find out the stationarity between the variable. To test stationarity of variables, we applied Augmented Dicky Fuller (ADF) and Phillips Pearson (PP) test on all the series. Following table shows the value of τ test statistics obtained by using ADF and PP test. Order of integration of some of the variable is equal to I(1) where as that of others is I(0). We need first difference of those variable which are not of order I(0). Order of integration of all the variable from the ADF and PP test is I(I). We have used the Wald test to examine bi-variate and multivariate causality between economic growth and financial development and vice versa for South East Asian countries. The results of the analysis is given in table-1

Indonesia:

The results of Granger causality Wald test for Indonesia are given in table-1 The Wald test results show that the coefficient of the financial indicators such as: ratio of liquid liabilities to GDP and ratio of stock market capitalization to GDP are not jointly zero in the equation for growth rate of real GDP per capita, indicating that financial development indicators cause growth rate of real GDP per capita. However the coefficient of ratio of private credit to GDP and ratio of commercial bank assets to total bank assets are jointly zero and reject the null hypothesis that private credit to GDP and commercial bank assets does not granger cause growth.

When we see the multivariate causality the coefficient of lags of all the development indicators taken together are not jointly zero in the equation for growth rate of real GDP per capita. This favors the alternative that financial development indicators cause growth rate of real GDP per capita.

However when we examine the reverse causality, the coefficients of lags of growth rate of real GDP per capita are not jointly zero in the equation for financial development indicators: private credit to GDP ratio, liquid liabilities to GDP ratio, ratio of commercial bank assets to total bank asset and ratio of stock market capitalization to GDP). This favors the hypothesis that growth rate of real GDP causes financial development as indicated by ratios of private credit to GDP ratio, liquid liabilities to GDP ratio, ratio of commercial bank assets to total bank

Table-1: Granger Causality Wald test result for South East Countries

Equation	Excluded	Indonesia		Korea		Malaysia		Thailand	
		ChiSqure	Prob > chi2	ChiSqure	Prob > chi2	ChiSqure	Prob > chi2	ChiSqure	Prob > chi2
GRGDPC	LQGDP	10.7523	0.0046*	3.1829	0.2036	1.5613	0.4581	12.5296	0.0019*
GRGDPC	PCGDP	4.1132	0.1279	4.1850	0.1234	1.8573	0.3951	9.2725	0.0097*
GRGDPC	DMBATA	2.2974	0.3170	2.8363	0.2422	0.7102	0.7011	6.0627	0.0483**
GRGDPC	SMCGDP	14.4423	0.0007*	1.8692	0.3927	0.1860	0.9112	5.4263	0.0663**
GRGDPC	ALL	23.9252	0.0024*	11.7251	0.1639	5.0159	0.7559	26.8491	0.0008*
LQGDP	GRGDPC	6.1443	0.0463**	39.3851	0.0000*	9.6414	0.0081*	36.2880	0.0000*
PCGDP	GRGDPC	10.0956	0.0064*	32.0953	0.0000*	38.9648	0.0000*	12.9771	0.0015*
DMBATA	GRGDPC	48.0493	0.0000*	11.7058	0.0029*	0.5151	0.7729	5.6196	0.0602**
SMCGDP	GRGDPC	15.7751	0.0004*	5.7574	0.0562**	9.9360	0.0070*	4.2304	0.1206

Notes: *, ** and *** indicate 1%, 5% and 10% level of significance respectively

asset and ratio of stock market capitalization to GDP). The result suggests that bi-causality exist between growth and financial development as indicated by financial indicators such as ratio of liquid liabilities to GDP and ratio of stock market capitalization to GDP. The growth causes financial development as proxied by the ratio of the indicators ratio of private credit to GDP and ratio of commercial bank assets to total bank asset.

Korea:

The results of Granger causality Wald test for Korea are given in table-1. The results of the Wald test show that the coefficients on the lags of all the financial development indicators in the equation for growth rate of real GDP per capita are jointly zero. In this case we cannot reject the null hypothesis that financial development indicators does not Granger causes growth rate of real GDP.

When we see the reverse causality, the result of the Wald test show that the coefficient of the lags of growth indicator are not jointly zero in the equation for financial development indicators such as ratio of liquid liabilities to GDP, private credit to GDP ratio, commercial bank assets to total bank assets and stock market capitalization to GDP ratio. This favors the hypothesis that growth rate of real GDP per capita causes financial development. When we see the multivariate causality between growth and financial development, the multivariate causality doesn't exist between economic growth and financial development indicators. Thus except for ratio of commercial bank asset to total bank assets all other variable are caused by growth at 5% level of significance.

Malaysia:

The results of the Granger causality Wald test for Malaysia are given in table-1. The results of the Wald test show that the coefficients on the lags of all the financial development indicators in the equation for growth rate of real GDP per capita are jointly zero. In this case we cannot reject the null hypothesis that financial development indicators does not Granger causes growth rate of real GDP. When we see the reverse causality, the Wald test suggest that the coefficient of the growth rate of real GDP per capita are not jointly zero in the equation for financial development indicators: liquid liabilities to GDP ratio, private credit to GDP ratio and stock market capitalization to GDP ratio. This favors the hypothesis that growth causes financial development. The coefficient of the growth rate of real GDP per capita are jointly zero in the equation for ratio of stock market capitalization to GDP, in this case it rejects the alternatives that growth does not granger causes ratio of stock market capitalization to GDP.

Thailand:

The results of the Granger causality Wald test for Thailand are given in Table-1. The Granger causality Wald test results show that the coefficients of the financial development indicators such as liquid liabilities to GDP ratio, private credit to GDP ratio, ratio of commercial bank asset to total assets and stock market capitalization to GDP ratio are not jointly zero in the equation for growth rate of real GDP per capita. This indicates that financial development indicators cause economic growth.

When we examine the multivariate causality the coefficient of the lags of all the development indicators taken together are not jointly zero in the equation for growth rate of real GDP per capita therefore it favors the alternative that financial development indicators cause economic growth as captured by rate of real GDP per capita.

However when we see the reverse causality, the coefficients of growth rate of real GDP per capita are not jointly zero in explaining the equations for financial development indicators: liquid liabilities to GDP ratio, private credit to GDP ratio, ratio of commercial bank assets to total bank assets. This favors the hypothesis that growth rate of real GDP per capita causes financial development as measured by liquid liabilities to GDP ratio, Private credit to GDP ratio, ratio of commercial bank assets to total bank assets. However the reverse is not true in case of ratio of stock market capitalization to GDP, in this case it rejects the alternative hypothesis that growth does not Granger cause ratio of stock market capitalization to GDP.

The results suggest the hypothesis that bi-causality exist between growth and financial development for the indicators liquid liabilities to GDP ratio, private credit to GDP ratio and ratio of commercial bank assets to total assets. The financial development causes growth for ratio of stock market capitalization to GDP.

In the case of South East Asian countries we find that liquid liabilities to GDP ratio and stock market capitalization to GDP ratio are common variables causing growth in Indonesia and Thailand. All financial development variables taken together cause growth in the case of these two countries. But the causality from financial development variable to economic growth has been seen in all the four countries. However bi-causality has been seen in Thailand for all the variable and in the case of Indonesia for two

indicators: ratio of liquid liabilities to GDP and stock market development to GDP ratio.

Long Run Causality

To understand the long run movement of the variables, co-integration analysis was resorted on the data of each country for all the variables used in the causality analysis. This analysis is also done segment wise. Firstly we show the co-integration results of South East Asian countries.

South East Asian Countries:

Indonesia:

The results of the co integration procedure for Indonesia are given in table-2

Table 2: Co-integrating Equation For Indonesia

Variable	No of co-integrating equation	Co-integrating vector
Financial Development Causes Economic Growth		
NGRGDPC, LQGDP	1	= -0.051875+ 0.053565 (LQGDP (0.03679) Log Likelihood =156.5077
GRGDPC, SMCGDP	1	= -0.041151 + 0.098126(SMCGDP) (0.04557) Log likelihood = 92.44420
GRGDPC, PCGDP	2	= 0.057033 – 0.069127 (PCGDP) (0.04532) Log Likelihood =114.0347
GRGDPC, DMBA	1	= 0.049842 – 0.022483(DMBA) (0.02940) Log likelihood = 113.7931
GRGDPC, LQGDP, PCGDP, DMBA, SMCGDP	4	=0.239452 – 0.934768(LQGDP) 0.349846(PCGDP) (0.52589) (0.39830) +0.0228989(DMBA) +1.762963(SMCGDP) (0.30953) (1.00918) Log likelihood =282.6419
Economic Growth Causes Financial Development		
LQGDP, GRGDPC	1	= 0.968411-18.66883(GRGDPC) (12.8233) Log likelihood=156.5077
PCGDP, GRGDPC	2	= 0.825043-14.46612(GRGDPC) (9.46542) Log likelihood=114.0347
DMBA, GRGDPC	1	=2.216861-44.47741(GRGDPC (58.1508) Log likelihood=113.7931
SMCGDP, GRGDPC	1	=0.419367-10.19102(GRGDPC) (4.73252) Log likelihood=92.44420

Note: The values in the parenthesis are standard errors

The table 2 shows that the LR test rejects the hypothesis of no co-integration at 5% level of significance but not the hypothesis of at the most one co-integrating relationship between economic growth and financial development indicators ratio of liquid liabilities to GDP, ratio of commercial bank assets and to total banking assets stock market capitalization to GDP. Two co-integrating equations have been indicated for the financial development indicator: private credit to GDP ratio.

When we test the relationship from economic growth to financial development the LR test rejects the hypothesis of no co integration at both 5% level of significance but not the hypothesis of at the most one co-integrating relationship for the financial development indicators: Liquid liabilities to GDP, commercial bank assets to total banking assets ratio of and stock market capitalization to GDP. This shows the unique relationship between financial development and economic growth. The LR tests also accept the hypothesis of two co-integrating vector between private credit to GDP ratio and economic growth showing the non-unique relationship between economic growth and financial development indicators. When we tested for the multivariate co-integration from economic growth to financial development the LR test accept the hypothesis of 4 co-integrating equation at 5% level of significance showing the non-unique relationship between economic growth and financial development indicators.

Korea:

The results of the co integration procedure for Indonesia are given in table-3.

In the above table 3 the LR test rejects the hypothesis of no co-integration at both 5% and 10% levels of significance but not the hypothesis of at the most one co-integrating relationship between economic growth and financial development indicators ratio of liquid liabilities to GDP, commercial bank assets and stock market capitalization to GDP. Two co-integrating equation for the financial development indicators: private credit to GDP ratio. When we tested the causality relationship from economic growth to financial development the LR test rejects the hypothesis of no co-integration at both 5% and 10% levels of significance but not the hypothesis of at most one co-integrating relation for the financial development indicators: ratio of Liquid liabilities to GDP, commercial bank assets to total bank assets and stock market capitalization to GDP, showing the unique relationship between financial development and economic growth. The LR tests also accepted the hypothesis of two co-integrating vector between private credit to GDP ratio and economic growth

Table 3: Co-integrating Equation For Korea

Variable	No of co-integrating vector	Co-integrating equation
Financial Development Causes Economic Growth		
GRGDPC, LQGDP	1	=0.075269 –0.038042(LQGDP) (0.02551) Loglikelihood=146.5663
GRGDPC, PCGDP	2	=0.043027+0.027837 (PCGDP) (0.02939) Loglikelihood =150.2977
GDRGDPC, DMBA	1	=0.002100+ 0.084515 (DMBA) (0.06472) Log likelihood =135.0876
GRGDPC, SMCGDP	1	=0.066149 +0.050204(SMCGDP (0.03525) Log likelihood=77.08261
GRGDPC, LQGDP, SMCGDP, PCGDP, DMBA	3	=0.263794 –0.575268(LQGDP) +0.680325(PCGDP) (0.06638) (0.07324) -0.050950(SMCGDP) -0.368987(DMBA) (0.2133) (0.06758 Loglikelihood=328.4553
Economic Growth Causes Financial Development		
LQGDP, GRGDPC	1	= 1.978596-26.28692(GRGDPC) (17.6274) Log Likelihood = 146.5663
PCGDP, GRGDPC	2	= -1.545684-6.92370(GRGDPC) (37.9327) Log likelihood = 150.2977
DMBA, GRGDPC	1	= -0.024845-1.83216(GRGDPC) (9.06102) Log likelihood = 135.0876
SMCGDP, GRGDPC	1	= -1.317621-19.91893(SMCGDP) (13.9845) Log likelihood = 77.08261

Note: The values in the parenthesis are standard errors

Table 4: Co-integrating Equation For Malaysia

Variable	No of co-integrating vector	Co-integrating equation
Financial Development causes Economic Growth		
GRGDPC, LQGDP	2	=-0.080352 + 0.046487 (LQGDP)* (0.01498) Log likelihood =98.48157
GRGDPC, PCGDP	1	=0.058077-0.032698(PCGDP)* (0.01468) Log likelihood =123.5556
GRGDPC, DMBA	2	=0.106398 –0.106729(DMBA)* (0.08618) Log likelihood =112.9251
GRGDPC, SMCGDP	2	=-0.035461 +0.000365 (SMCGDP)* (0.00609) Loglikelihood =50.92630
GRGDPC, LQGDP, PCGDP, SMCGDP, DMBA	3	=0.005931+0.169378(LQGDP)* -.273497(PCGDP) * (0.02187) (0.03105) +0.04777(SMCGDP)* -0.013769(DMBA) (0.00562) (0.06219) Log likelihood=195.1131
Economic Growth Causes Financial Development		
LQGDP, GRGDPC	2	= -1.728502 – 21.51155 (GRGDPC)* (-6.93140) Log Likelihood = 98.48157
PCGDP, GRGDPC	1	= 1.776187 – 30.58306 (GRGDPC)* (13.7307) Log likelihood = 123.5556
DMBA, GRGDPC	2	=0.996896 – 9.369514 (GRGDPC (7.56572) Log likelihood = 112.9251
SMCGDP, GRGDPC	2	= 97.07904 – 2737.643 (GRGDPC) (45649.6) Log likelihood = 50.92630

Note: The values in the parenthesis are standard errors

showing the non-unique relationship between economic growth and the financial development indicator. When we tested the multivariate co-integration from economic growth to financial development the LR test accepted the hypothesis of 3 co-integrating equations at 5% level of significance showing the non-unique relationship between economic growth and financial development indicators.

Malaysia:

The results of the co integration procedure for Malaysia are given in table-4

We see from the above table that the LR test rejects the hypothesis of no co-integration at both 5% and 10% levels of significance but not the hypothesis of at most one co-integrating relationship between growth and financial development indicators: private credit to GDP ratio and two co-integrating equations for the financial development indicators: ratio of liquid liabilities to GDP, stock market capitalization to GDP, and ratio of commercial bank assets to total bank assets.

When we see the co-integrating relationship from financial development to economic growth the LR test accept the hypothesis of one co-integrating equation for the financial development indicators (private credit to GDP ratio) and two co-integrating equation for the indicators: ratio of liquid liabilities to GDP, stock market capitalization to GDP, and commercial bank assets to total bank assets. When we examine the multivariate co-integration from economic growth to financial development the LR test accept the hypothesis of 3 co-integrating equations from financial development to economic growth.

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showing the non-unique relationship between economic growth and the financial development indicator. When we tested the multivariate co-integration from economic growth to financial development the LR test accepted the hypothesis of 3 co-integrating equations at 5% level of significance showing the non-unique relationship between economic growth and financial development indicators.

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The results of the co integration procedure for Malaysia are given in table-4

We see from the above table that the LR test rejects the hypothesis of no co-integration at both 5% and 10% levels of significance but not the hypothesis of at most one co-integrating relationship between growth and financial development indicators: private credit to GDP ratio and two co-integrating equations for the financial development indicators: ratio of liquid liabilities to GDP, stock market capitalization to GDP, and ratio of commercial bank assets to total bank assets.

When we see the co-integrating relationship from financial development to economic growth the LR test accept the hypothesis of one co-integrating equation for the financial development indicators (private credit to GDP ratio) and two co-integrating equation for the indicators: ratio of liquid liabilities to GDP, stock market capitalization to GDP, and commercial bank assets to total bank assets. When we examine the multivariate co-integration from economic growth to financial development the LR test accept the hypothesis of 3 co-integrating equations from financial development to economic growth.

Thailand:

The results of the co integration procedure for Thailand are given in table-5.

Table 5: Co integrating Equations For Thailand

Variable	No of co-integrating vector	Co-integrating equation
Financial Development causes Economic Growth		
GRGDPC, LQGDP	1	= -0.061182+ 0.024314 (LQGDP) (0.02187) Log Likelihood = 140.9769
GRGDPC, DMBA	2	= 0.036814 - 0.106929(DMBA) (0.10174) Log likelihood = 150.5633
GRGDPC, SMCGDP	1	=-0.057605 + 0.051996 (SMCGDP) (0.01861) Log likelihood = 105.7872
GRGDPC, LQGDP, PCGDP, SMCGDP, DMBA	3	=-0.298118-0.035142(PCGDP) +0.058176(LQGDP) (0.4023) (0.02793) +0.473941(DMBA) -0.170412(SMCGDP) (0.5317) (0.02487) Log Likelihood= 368.6745
Economic Growth Causes Financial Development		
LQGDP, GRGDPC	1	=2.516360 – 41.12911(GRGDPC) (36.9972) Log likelihood=140.9769
DMBA, GRGDPC	2	=0.344284 +9.352001(GRGDPC) (8.89851) Log likelihood=150.5633
SMCGDP, GRGDPC	1	=1.107856-19.23207 (GRGDPC) (6.88309) Log likelihood=105.7872

Note: The values in the parenthesis are standard errors

The above table shows that the LR test rejects the hypothesis of no co-integration at both 5% and 10% levels of significance but not the hypothesis of at the most one co-integrating equation from economic growth to financial development for the financial development indicators: ratio of liquid liabilities to GDP and stock market capitalization to GDP and two co-integrating equation for the financial development indicators: ratio of commercial bank assets to total bank assets.

When we see the co-integration from financial development to economic growth the LR test accept the hypothesis of one co-integrating equation for the financial development indicators: ratio of liquid liabilities to GDP and ratio of stock market capitalization to GDP and two co-integrating equation for the financial development indicators ratio of commercial bank assets to total bank assets.

When we test the multivariate co-integration between economic growth and financial development the LR test accept the hypothesis of 3 co-integrating equation showing the no-unique relationship from financial development to economic growth.

For South East Asian countries we say that the results of Indonesia and Korea are same. The financial development indicators: ratio of liquid liabilities to GDP is showing unique relationship for all the countries except Malaysia. The financial development indicator: ratio of commercial bank assets to total bank assets is showing unique relationship in the case of Indonesia and Korea where as non-unique relationship for the countries Thailand and Malaysia. For the financial indicators private credit to GDP ratio, a unique relationship is found in the case of Malaysia and non-unique for Korea and Indonesia. The financial development indicators: ratio of stock market capitalization to GDP is showing unique relationship in case of Indonesia and Korea and non-unique relationship for the countries Malaysia and Thailand. So far as multivariate co-integration is concerned, all the countries are showing the non-unique relationship from financial development to economic growth indicators.

Short run and Long run Causality For Panel Data

As we know that VAR cannot be run on the panel data so we can't make use of the Granger Causality Wald test and Co-integration Analysis Johansen and Juselius (1990) procedure in case of Panel data. We use the Error Correction Methodology to see the long run as well as short run causality for panel data. In the ECM if coefficients of differenced independent variables became significant then it represents short run causality if the coefficient of the lagged predicted error term becomes significant that indicate long run causality between variables under consideration. The analysis is done for South East Asian countries.

The causality analysis for South East Asian countries shows that the short run causality exists from financial development indicators measured by ratio of private credit to GDP, ratio of liquid liabilities to GDP, stock market capitalization to GDP and ratio of commercial bank assets to total bank assets to economic growth The long run causality exist from financial development indicator as measured by ratio of commercial bank asset to total bank assets to economic growth.

When we see the reverse causality from growth to financial development, we find that the short run as well as long run causality exists for all the financial development indicators as measured by ratio of private credit to GDP, ratio of

Table 6: Result of Causality Using Granger's ECM For South East Asian Countries Panel

Dependent Variable	Independent Variable	ECM equation
Economic Growth causes Financial Development		
LQGDP	GRGDPC	= 0.019005* + 0.104334* (DGRGDPC) - 0.022061*et (7.143188) (1.811302) (-2.550721)
PCGDP	GRGDPC	= 0.011234 * + 0.106922 * (DGRGDPC) - 0.032568*et (4.506218) (1.976414) (-3.208932)
SMCGDP	GRGDPC	= 0.002634 – 0.144882 (DGRGDPC)* – 0.123579*et (1.315816) (-3.323483) (-8.061973)
DMBA	GRGDPC	= 0.021416 – 0.841328* (DGRGDPC) - 0.055403*et (3.086653) (-5.572073) (-4.234262
Financial Development Causes Economic Growth		
GRGDPC	LQGDP	=0.001649 +0.063173** (DLQGDP) + 0.072691et (-0.77512) (1.866310) (1.398504)
GRGDPC	PCGDP	=-0.01121+0.059537***(DPCGDP) + 0.044713et (-0.528594) (1.686319) (0.823208)
GRGDPC	SMCGDP	= 0.001133 –0.066729*(DSMCGDP) + 0.048221et (0.566901) (-5.488348) (0.940909)
GRGDPC	DMBA	= (1.33E-06) –0.144541*(DDMBA) +0.094237*et (0.000658) (-3.430072) (1.820731)
GRGDPC	LQGDP, PCGDP, SMCGDP DMBA	=0.000493+0.040397(DPCGDP) 0.06212*(DSMCGDP) (0.233622) (0.979077) (-5.062605) 0.023970(DLQGDP)–0.135738*(DDMBA) +0.051647et (0.667566) (-3.131189) (0.944760)

Note: The values in the parenthesis are standard errors

liquid liabilities to GDP, ratio of stock market capitalization to GDP and ratio of commercial bank assets to total bank assets to economic growth.

In case of multivariate causality the short run causality from financial development to economic growth exists for the financial development indicators stock market capitalization to GDP ratio and ratio of commercial bank assets to total bank assets but no long run causality is found in this case.

When we examine the causality from financial development to economic growth of panel data of entire emerging markets we find that short run causality exists from financial development indicator as measured by ratio of stock market capitalization to GDP to growth rate of real GDP per capita.

In the case of reverse causality from economic growth to financial development we find that short run causality

Table 7: Result of Causality Using Granger's ECM for Entire Panel of Emerging Market

Dependent Variable	Independent Variable	ECM equation
Financial Development causes economic growth		
GRGDPC	SMCGDP	=-0.004358 +0.041645 (DSMCGDP) + 0.0169856 et (0.566901) (-1.921783) (0.629203)
GRGDPC	LQGDP, PCGDP, DMBA SMCGDP	=0.007925-0.446655(DLQGDP)- 1.07848(DPCGDP)+0.113013 (0.463520) (-0.586822) (-1.123162) (0.765960 (DSMCGDP)+0.608488(DDMBA) +0.689540et (2.344856) (1.988776)
Economic Growth Causes financial development		
PCGDP	GRGDPC	= 0.008608-0.002491 (DGRGDPC) -0.028926*et (4.739992) (0.237015) (-3.72917)
DMBA	GRGDPC	= 0.004449* + 0.001922 (DGRGDPC) – 0.109082*et (2.326068) (0.173494) (-9.773672)
SMCGDP	GRGDPC	= 0.023167* - 0.067474* (DGRGDPC) - 0.052942*et (3.086653) (-5.572073) (-4.234262)

exists between economic growth and financial development indicators measured by ratio of stock market capitalization to GDP and long run causality exists for the financial development indicators: ratio of private credit to GDP, ratio of commercial bank asset to total bank asset and stock market capitalization to GDP. We don't find any short run and long run causality for the financial development indicator liquid liabilities to GDP ratio.

The result of the multivariate causality test from financial development to economic growth shows that the short run causality exists for the financial development indicator ratio of commercial bank assets to total bank assets. But no long run causality is found in multivariate analysis.

Conclusions

In this chapter we tried to test the causality between financial development and economic growth by using the Granger Causality Wald test and Co-integration Analysis. In the case of South East Asian countries we find that bi-causality exists between financial development and economic growth for the variables measuring financial intermediation and stock market development. These variables are common variables in Indonesia and Thailand. Multivariate causality flows from financial development to economic growth for all the countries. The causality from financial development variables to economic growth has been seen for all the four countries.

For South East Asian countries, we see that the results of Indonesia and Korea are same. The financial development indicator financial intermediation is showing unique relationship for all the countries except Malaysia. The banking sector development show unique relationship in the case of Indonesia and Korea where as non-unique relationship for the countries Thailand and Malaysia. For the financial indicator private credit to GDP ratio, a unique relationship is found in the case of Malaysia and non-unique for Korea and Indonesia. The stock market development is showing unique relationship in the case of Indonesia and Korea and non-unique relationship for the countries Malaysia and Thailand. So far as multivariate co-integration is concerned, all the countries are showing the non-unique relationship from financial development to economic growth indicators.

To test the causality in the panel data we used the Granger ECM methodology. For South East Asian countries it is found that short run causality from financial development to economic growth and short run as well as long run causality in the reverse direction.

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