

FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN ASIAN COUNTRIES: TESTING THE FINANCIAL-LED GROWTH HYPOTHESIS

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1. Introduction

The seminal work of Patrick (1966) has resulted in widespread investigations into the role of the financial sector as an engine for economic growth. Patrick points out two possible relationships between financial development and economic growth. First, as the economy grows, it generates demand for financial services which he called a "demand-following" phenomenon. According to this view, the lack of financial institutions in developing countries is an indication of lack of demand for their services. Second, the establishment and the widespread expansion of financial institutions in an economy may actively promote development, which Patrick called "supply-leading" phenomenon. This latter view which has been dubbed the "financial-led" growth hypothesis has been popular among governments in several developing countries as a means to promoting development¹.

Goldsmith (1969), McKinnon (1973), Shaw (1973), Fry (1988) and more recently King and Levine (1993) are among others who have provided evidence that financial development is a prerequisite for economic growth. Nevertheless, other researchers are skeptical with respect to the financial-led growth hypothesis. Dornbusch and Reynoso (1989) have questioned the conclusions of previous influential studies and argue that the evidence in support of the financial-led growth paradigm is "episodic" and a "vast exaggeration". We believe that there are at least three reasons why financial-led growth hypothesis is rejected in more recent studies. First, the conclusions reached by previous influential studies are subject to what Granger and Newbold (1977) dubbed as 'spurious regression results'. Traditionally, it has been general practice to regress one integrated series against another integrated series. However, Granger and Newbold have warned against using integrated series as it will invalidate the statistical tests on which hypotheses are commonly tested, and frequently leads to the acceptance of a spurious regression. More recently, Engle and Granger (1987) have introduced the cointegration methodology to avoid spurious regression problems. The cointegration approach provides a way in which the long-run information of the integrated series in level is conserved into equations that comprise stationary components (called the error correction model) that give valid statistical inferen-

¹ For a comprehensive study on financial development-economic growth nexus in developing countries, see Gupta (1984) and Jung (1986).

ces. Secondly, as noted by Fry (1996, p. 1), "whatever positive effects of financial liberalisation were detected in the 1970s appear to have become smaller over time". Several factors could contribute to the diminishing effect of financial liberalisation on economic growth. For example, it may be that other forms of financial repression exist in the economy, or that there are financial distortions in the form of high real interest rates and black market exchange rates. There may also be a "crowding-out effect" from other macroeconomic policies (The World Bank, 1989; Fry, 1996).

Since the seminal article of Engle and Granger (1987), the method of cointegration has been a popular approach used in testing economic hypotheses; among others are the financial-led hypothesis, export-led hypothesis, law of one price, purchasing power parity, capital mobility, Wagner's law and so on. However, testing for the financial-led hypothesis using the cointegration approach is of recent application. Demetriades and Hussein (1996), Arestis and Demetriades (1996), Murinde and Eng (1994) and Thornton (1996) are among the few studies that have tested the financial-led hypothesis on several Asian countries. Using annual data from 1965 to 1992, Demetriades and Hussein found that among the Asian countries covered under the study, only in the case of Sri Lanka did the evidence support the financial-led growth hypothesis. For Pakistan, their result indicates that economic growth causes financial development. Further, Demetriades and Hussein's study suggests that bidirectional causal relationships are evident for India, South Korea and Thailand. In another related study, Arestis and Demetriades further support the evidence that the relationships between financial development and economic growth for India and South Korea is bidirectional.

Murinde and Eng tested the financial-led hypothesis on Singapore using quarterly data for the period 1979:1 to 1990:4. Using an array of financial indicators, they found that the results strongly support the financial-led hypothesis for Singapore. On the other hand, Thornton provides some empirical evidence on the supply-leading hypothesis in several Asian countries. Using annual data as far back as 1950s to 1990, Thornton found that the financial-led hypothesis was supported by monetary data of Nepal, the Philippines and Thailand. The demand-following hypothesis was supported by Myanmar and South Korean monetary data. However, a bidirectional relationship between the monetisation variable and economic growth is evident for Malaysia. For India and Sri Lanka, the results suggest that there is no causal relationship between economic growth and the financial indicator.

The object of this paper is to provide further evidence on the financial-led growth

hypothesis proposed by Patrick using the cointegration framework. In this study we attempt to answer which sector, financial or real, leads in the dynamic process of economic development in seven Asian developing countries. The seven Asian countries are Indonesia, Malaysia, Myanmar, Nepal, the Philippines, Sri Lanka and Thailand. This study departs from the earlier work in three respects. First, we investigate the time series properties of the series prior to Granger-causality testing. Thus, our study is not comparable with the earlier finding of Gupta (1984) and Jung (1986). Second, in this study we used quarterly data covering the period of 1981:1 to 1994:4, during which financial deregulation and innovations have been prominent features in the financial systems of the seven Asian countries. Among the important features are interest rate liberalisation, the emergence of bank and non-bank financial intermediaries and the offering of new financial instruments in the financial system. Furthermore, during this period, financial assets have been growing faster than income². Thus, we will be able to test indirectly whether the growth of the financial sector as a result of financial liberalisation has enhanced economic growth in these countries. Finally, for the first time, a Divisia monetary aggregate is proposed as an alternative proxy for financial development in testing the financial-led growth hypothesis.

2. Model Specification and Empirical Results

Our task is to determine the causal direction between the two variables in question. Does financial development lead economic growth or otherwise? In other words, we are testing whether monetary data in the Asian developing countries support the "financial-led" growth hypothesis. We do this using the standard Granger causality test. However, for a given set of $I(1)$ variables that are cointegrated, causality tests conducted in first-differenced vector autoregressive (VAR) framework will be misspecified unless the lagged residuals (error-correction coefficient) from the cointegrating regression is also included in the VAR specification. We specify the following bivariate vector error-correction models (VECM),

² See Habibullah and Smith (1997) for further discussions and descriptions on financial liberalisation in selected Asian developing countries.

$$\Delta y_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta y_{t-i} + \sum_{i=1}^q \beta_i \Delta x_{t-i} + \gamma_1 ecm_{t-1} + \epsilon_{1t} \quad [1]$$

$$\Delta x_t = \delta_0 + \sum_{i=1}^p \delta_i \Delta x_{t-i} + \sum_{i=1}^q \phi_i \Delta y_{t-i} + \gamma_2 ecm_{t-1} + \epsilon_{2t} \quad [2]$$

were ecm_{t-1} is the lagged residual from the cointegration between y_t and x_t in level. Granger (1988) points out that based on equation [1], the null hypothesis that x_t does not *Granger cause* y_t is rejected not only if the coefficients on the x_{t-i} are jointly significantly different from zero, but also if the coefficient on ecm_{t-1} is significant. The VECM also provides for the finding that x_t *Granger cause* y_t , if ecm_{t-1} is significant even though the coefficients on x_{t-i} are not jointly significantly different from zero. Furthermore, the importance of α 's and β 's represent the short-run causal impact, while γ gives the long-run impact. In determining whether y_t *Granger cause* x_t , the same principles applies with respect to equation [2].

Before we can estimate equations [1] and [2], the requirement is that all variables (both monetisation and financial development indicators) are stationary. In this study, the monetisation variable used as proxy for financial development is the ratio of broad money supply M2 to Gross National Product (M2/GNP)³. Apart from the traditional Simple-sum money, we also used the Divisia measurement of money in this study⁴. Therefore, we have two measurements of the monetisation variables, the Simple-sum SM2/GNP and Divisia DM2/GNP. For the real sector, we used real GNP. Since nominal GNP in the Asian countries is available only in annual form, the quarterly GNPs was interpolated using the method suggested by Chow and Lin (1976)⁵.

Following this approach, quarterly data for GNP was interpolated from annual ob-

³ The ratio of broad money M2 to GNP is one of the more popular proxy for financial development indicator. For recent application, see Murinde and Eng (1994), Gelb (1989) and King and Levine (1993).

⁴ Habibullah (1997a) provides detail discussions on the computation of the Divisia monetary aggregates for the seven Asian developing countries.

⁵ For recent application of this technique, see Bahmani-Oskooee (1986), Hataiseree (1993), Huang (1995) and Habibullah (1997a, 1997b, 1998a, 1998b).

servations according to the pattern of quarterly movements in government expenditure and exports. Consumer price index was used to deflate for real GNP⁶.

The standard procedure for determining the stationarity (order of integration) of a time series is the application of augmented Dickey-Fuller test (Dickey and Fuller, 1981) which requires regressing Δy_t on a constant, a time trend, y_{t-1} and several lags of the dependent variables to render the disturbance term white-noise. Table 1 reports the results of integration tests for the three series used in the analysis, that is, SM2/GNP, DM2/GNP and real GNP⁷. Several observations can be made from these results. For Malaysia, Myanmar and Nepal, all three series are stationary in levels. For other Asian countries; the Philippines-SM2/GNP and DM2/GNP, Sri Lanka-SM2/GNP and Thailand-DM2/GNP are also stationary in levels. Other series which indicate unit root are tested further for two unit roots. These results are reported in column 5 in Table 1. The series-SM2/GNP, DM2/GNP and real GNP for Indonesia, real GNP for the Philippines, DM2/GNP and real GNP for Sri Lanka and SM2/GNP and real GNP for Thailand indicate that the null hypothesis of two unit roots can be rejected at five percent significance level. Thus, these series are best characterised as I(1) processes, that is, they achieved stationarity after first-differenced.

⁶ All data pertaining to the seven Asian countries were collected from various issues of the *SEACEN Financial Statistics-Money and Banking* and *International Financial Statistics*. The *SEACEN Financial Statistics-Money and Banking* is published by the South East Asian Central Banks (SEACEN) Research and Training Centre, Kuala Lumpur, Malaysia. *International Financial Statistics* is published by the International Monetary Fund, Washington, D.C. For all estimation in the study, we take seasonally adjusted data covering the period 1981.1 to 1994.4 (except for Myanmar, data ended 1994.2). All data were transformed into natural logarithm.

⁷ For the determination of lag length, we employ Perron's (1989) liberal approach which consists in starting with a given number of lagged dependent variables and paring down the model by the usual *t*-statistic. If the *t*-statistic on the last lagged term is less than 1.6, the term is dropped from the model. The process is repeated until the *t*-statistic on the last lagged coefficient is greater than 1.6. Furthermore, for each lag length chosen, the presence of serial correlation in the residuals is checked using the Breusch-Godfrey LM principle.

Table 1: Results of Integration Tests

Country	Series	Series in levels		LM(4)	Series in first-differences:		
		t_{ADF}	Lags		t_{ADF}	Lags	LM(4)
Indonesia	SM2/GNP	- 2.66	7	4.68	- 5.61*	5	6.80
	DM2/GNP	- 3.06	7	5.46	- 5.24*	5	8.45
	real GNP	- 3.19	7	4.01	- 6.26*	5	6.85
Malaysia	SM2/GNP	- 4.41*	3	1.79	—	—	—
	DM2/GNP	- 7.71*	0	8.18	—	—	—
	real GNP	- 4.49*	3	2.97	—	—	—
Myanmar	SM2/GNP	- 6.78*	3	6.60	—	—	—
	DM2/GNP	- 7.43*	3	4.75	—	—	—
	real GNP	- 6.35*	3	4.71	—	—	—
Nepal	SM2/GNP	- 3.64*	7	8.54	—	—	—
	DM2/GNP	- 4.68*	3	6.00	—	—	—
	real/GNP	- 4.33*	7	8.60	—	—	—
Philippine	SM2/GNP	- 4.57*	3	6.88	—	—	—
	DM2/GNP	- 4.19*	3	5.44	—	—	—
	real/GNP	+ 3.47	3	4.29	- 3.85*	2	7.58
Sri Lanka	SM2/GNP	- 3.65*	7	2.99	—	—	—
	DM2/GNP	- 3.13	7	4.18	- 4.49*	9	1.04
	real/GNP	- 1.82	6	2.38	- 6.86*	5	2.03
Thailand	SM2/GNP	- 2.81	7	6.54	- 6.33*	4	8.68
	DM2/GNP	- 4.44*	7	7.75	—	—	—
	real/GNP	- 1.46	8	1.11	- 4.92*	3	8.39

Notes: Asterisk * denote statistically significant at 5% level. Under the null hypothesis, for 50 observations, the 5% critical value of the t_{ADF} is - 3.50 (see Fuller, 1976). Critical value for the χ^2 for LM(4) at 5% is 9.48.

After determining that the series are of the same order of integration, we test whether the linear combination of the series that are non-stationary in levels are cointegrated. These are I(1) series for Indonesia, Sri Lanka and Thailand. To conduct the cointegration test, we follow the popular Engle and Granger (1987) two-step procedure for testing the null of no cointegration. The first step of the Engle and Granger's procedure is to determine α as the slope coefficient estimate from the OLS regression of y on a constant (c) and x . A test of cointegration is then that the residuals μ_t (i.e. $y_t - c - \alpha x_t$) from the "cointegrating regression" be stationary. So in the second step,

the ADF unit root test is conducted on the residual μ_t so as to reject the null hypothesis of integration (of order 1) in favour of stationarity, using the critical values which are provided in MacKinnon (1991). If the ADF statistics are not large and negative then it is likely that the series are not cointegrated. These results are presented in Table 2. In all cases the null of no cointegration cannot be rejected at the five percent significance level. The results suggest that there is no long-run relationship between the growth of the financial sector and economic growth. Therefore, the traditional Granger-causality testing can be appropriately carried out using equations [1] and [2] without the error correction term (ecm_{t-1}).

Table 2: Results of Cointegration Tests

Country	Cointegrating Regression	t_{ADF}	Lags	LM(4)
Indonesia	real GNP=f(SM2/GNP)	- 2.36	7	0.81
	real GNP=f(DM2/GNP)	- 2.04	7	0.90
Sri Lanka	real GNP=f(DM2/GNP)	- 0.61	6	2.48
Thailand	real GNP=f(SM2/GNP)	- 2.46	7	7.02

Notes: For 50 observations, critical value at 5% level is - 3.45 (see MacKinnon, 1991). Critical value for the χ^2 for LM(4) at 5% is 9.48.

The results of the Granger-causality tests (equations [1] and [2]) are reported in Table 3. Following Thornton's study, we also used the Final Prediction Error (FPE) criterion proposed by Akaike (1969) in determining the appropriate lag length. The F -test is performed to determine whether financial development causes economic growth or *vice versa*. These results are summarised in Table 4, differentiating between the two measurements of money Simple-sum and Divisia aggregates.

Table 3: Results of Granger-Causality Tests

Country	Monetisation variable	Financial development causes economic growth:		Economic growth causes financial development:	
		FPE lags	F-statistics	FPE lags	F-statistics
Indonesia	Simple-sum	[2, 2]	5.362 (0.009)**	[7, 2]	7.697 (0.002)**
	Divisia	[2, 2]	3.453 (0.042)**	[8, 3]	5.738 (0.003)**
Malaysia	Simple-sum	[2, 2]	2.296 (0.115)	[1, 2]	2.551 (0.091)*
	Divisia	[2, 2]	1.990 (0.151)	[2, 2]	4.842 (0.013)**
Myanmar	Simple-sum	[4, 1]	1.375 (0.249)	[4, 2]	3.470 (0.043)**
	Divisia	[4, 1]	1.722 (0.198)	[4, 2]	2.968 (0.066)*
Nepal	Simple-sum	[8, 1]	0.016 (0.897)	[4, 10]	2.245 (0.049)**
	Divisia	[8, 4]	1.730 (0.172)	[4, 10]	2.257 (0.048)**
Philippine	Simple-sum	[4, 1]	4.263 (0.046)**	[4, 1]	0.445 (0.509)
	Divisia	[4, 1]	4.166 (0.049)**	[8, 1]	0.408 (0.527)
Sri Lanka	Simple-sum	[10, 8]	2.035 (0.091)*	[5, 0]	2.339 (0.042)**
	Divisia	[10, 6]	3.776 (0.009)**	[10, 9]	4.077 (0.004)**
Thailand	Simple-sum	[8, 1]	1.985 (0.169)	[1, 8]	1.682 (0.143)
	Divisia	[8, 8]	2.479 (0.042)**	[4, 3]	3.223 (0.035)**

Notes: In columns 4 and 6, the numbers in parentheses are *p*-values. Asterisks ** and * denote statistically significant at 1% and 5% level respectively.

Table 4: Summary of Granger-Causality Tests According to Simple-Sum Versus Divisia Money

Country	Simple-sum money as monetisation variable:			Divisia money as monetisation variable:		
	Supply leading F→Y	Demand following Y→F	Bidirectional F↔Y	Supply leading F→Y	Demand following Y→F	Bidirectional F↔Y
Indonesia	—	—	√	—	—	√
Malaysia	—	√	—	—	√	—
Myanmar	—	√	—	—	√	—
Nepal	—	√	—	—	√	—
Philippine	√	—	—	√	—	—
Sri Lanka	—	—	√	—	—	√
Thailand	—	—	—	—	—	√

Notes: F and Y denote financial development and economic growth respectively. Symbols '√' and '—' denote 'evidence of causation' and 'unrelated' respectively.

Clearly enough, as shown in Table 4, only in the case of the Philippines that the results suggest unidirectional Granger-causality running from financial development to economic growth which is consistent with Thornton's study, thus, supporting the financial-led growth hypothesis. A unidirectional Granger-causality from economic growth to financial development (i.e. demand-following hypothesis) is, however, supported in 3 out of 7 countries, that is in the cases of Malaysia, Myanmar (consistent with Thornton's study) and Nepal. A bidirectional Granger-causality is supported in only 2 out of 7 countries analysed. These countries were Indonesia and Sri Lanka. But, for Thailand, there is no causal relationship between financial development and economic growth.

On the other hand, the used of Divisia money as a proxy for the financial development indicator give interesting results. Not surprisingly, similar results as derived by the Simple-sum monetary aggregate are shown by the Divisia aggregate for all Asian countries except for Thailand. In the case of Thailand, using Divisia money as proxy for financial development indicator, our results suggest that there is bidirectional causal relationships between economic growth and financial development. These results clearly suggest the potential role of Divisia money as proxy for financial development indicator.

3. Conclusions

In this study we have investigated the relationship between financial development and economic growth of seven Asian countries, namely; Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka and Thailand. The sample period under study cover the deregulation era of the 1980s and 1990s, in which interest rates liberalisation has been a prominent feature in these countries. It is expected that the relationship between financial development and economic growth during this period would be stronger and significant. Apart from using the traditional Simple-sum money, we have proposed the Divisia monetary aggregate as an alternative proxy for financial development indicator. The use of Divisia aggregate provide an appropriate measurement of monetary/financial services of an economy. In this study, the time series properties of the financial and real sector indicators were investigated before we conduct the cointegration and Granger causality analyses.

In general, our results suggest that there is a strong relationship between financial development and economic growth in the Asian countries. In other words, financial development does matter for economic growth and *vice versa*. However, the direction of causation between finance and economic growth is country specific. This implies that depending on each country's stages of development, economic development should precede the development of the financial markets, but in others, the development in the financial system would enhance economic growth. In other cases, we would find that both financial development and economic growth complement each other. The financial-led growth hypothesis is supported only in the case of Philippines. In other Asian countries, the demand-following hypothesis, that is, the case of economic growth causes financial development is supported by Malaysia, Myanmar and Nepal. On the other hand, a bidirectional causality between financial development and economic growth are evident for Indonesia, Sri Lanka and Thailandia.

Another important conclusion relates to the link between financial development and economic growth in this study, is that, the proposed Divisia monetary aggregate does well in explaining the role of finance on economic growth. This is clearly shown in the case of Thailand where the Divisia-financial development indicator outperform the Simple-sum aggregate. A misleading results of no causal relationship between financial development and economic growth in Thailand would have been reached if the result is solely based on the traditional Simple-sum aggregate and this would contrast with World Bank's conclusion that financial development has been a contributing factor for the rapid economic development in the Asian region including Thailand.

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Abstract

In this study, we have investigated the relationship between financial development and economic growth in seven Asian developing countries. The sample period under study covers the deregulation era of the 1980s and 1990s, in which interest rates liberalisation has been a prominent feature in these countries. Apart from using the traditional Simple-sum money, we have proposed Divisia monetary aggregate as alternative proxy for financial development indicator. In this study, the time series properties of the financial and real sectors indicators were investigated before we conduct the cointegration and Granger causality analysis. In general, our results suggest that there is a strong relationship between financial development and economic growth in the Asian developing countries. Another important conclusion is that the proposed Divisia monetary aggregate does well in explaining the role of finance on economic growth.

DÉVELOPPEMENT FINANCIER ET CROISSANCE ÉCONOMIQUE EN ASIE: VÉRIFICATION DE L'HYPOTHÈSE DE LA CROISSANCE GUIDÉE PAR LE DÉVELOPPEMENT FINANCIER

Résumé

Dans cette étude on a analysé la relation entre le développement financier et la croissance économique de plusieurs pays en voie de développement asiatiques. La période considérée comprend l'âge de la déréglementation des années 1980 et 1990, caractérisée surtout par la libéralisation des taux d'intérêt. Comme indicateurs approximatifs du développement financier on a utilisé le "Simple-sum money" traditionnel, mais aussi l'indicateur monétaire Divisia. Dans l'étude, on a examiné les propriétés des séries temporelles des indicateurs du secteur réel et du secteur financier avant d'effectuer l'analyse de cointégration et le test de causalité de Granger. En général, nos résultats semblent suggérer une forte relation entre développement financier et croissance économique dans les pays en voie de développement de l'Asie et également que l'indicateur monétaire Divisia se prête bien à expliquer le rôle de la finance dans la croissance économique.

