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Inflation, financial development, and economic growth: the case of Malaysia and Thailand

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By employing battery of time-series techniques, the paper empirically examines the short- and long-run finance-growth nexus after the 1997 financial crisis in Malaysia and Thailand. Based on autoregressive distributed lag (ARDL) models, the study documents a long-run equilibrium between economic growth, finance depth, and inflation. Granger causality tests based on the vector error correction model (VECM) further reveals that there are (a) a unidirectional causality running from finance to growth in Malaysia, thus supporting the "finance-growth-led hypothesis" or the "supply-leading view"; and (b) a bidirectional causality between financial development and economic growth in Thailand, which accords with the "feedback hypothesis" or "bidirectional causality view". Based on the variance decompositions (VDCs) and the impulse-response functions (IRFs), the study discovers that the variations in the economic growth rely very much on their innovations. To promote growth in these countries, long-run policies—e.g., the enhancement of existing financial institutions both in the banking sector and the stock market—should be given priority.

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1. Introduction

After the 1997 Asian financial crisis, the economies of Malaysia and Thailand have remarkably recovered. Based on the International Monetary

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Fund (IMF) report [2006], Malaysian and Thai economies grew by 5.9 and 5.0 percent, respectively. Malaysia's growth rate is above the ASEAN (Association of Southeast Asian Nations) average growth of 5.8 percent, while that of Thailand is below the regional average. Compared to the growth rates of larger emerging economies such as India and China, those of Malaysia and Thailand are slightly higher [Mussa 2006]. What are the reasons for these countries' differing economic growth rates? Although this fundamental question has been raised by researchers in the area of economic development in the case of developed economies since the early 1930s, it is still relevant in today's context of the Malaysian and Thai economies. The literature on empirical growth has come up with numerous explanations for cross-country differences in growth, including the degree of macroeconomic stability, international trade, resource endowments, legal system effectiveness, religious diversity, and educational attainment. The list of likely factors continues to expand, apparently without limit [Khan and Senhadji 2000].

Out of the factors contributing to economic growth, the role of the financial sector has begun to receive attention recently. The recognition of a significant relationship between financial development and economic growth dates back to the *Theory of Economic Development* by Schumpeter [1912]. However, the question of whether financial development preceded economic growth or vice versa has been debated on in economic growth and finance. The pioneering studies on this area—such as those by Goldsmith [1969], Schumpeter [1932], and more recently, McKinnon [1973] and Shaw [1973]—documented positive relationships between financial development and economic growth. Robinson [1952] found that financial development follows economic growth. Lucas [1988] argued that financial development and economic growth are independent and not causally related. Finally, Demetrides and Hussein [1996] and Greenwood and Smith [1997] postulated that the two variables are mutually causal, i.e., they have a bidirectional causality.

Despite voluminous studies on finance-growth nexus in the advanced economies, similar studies on the Malaysian and Thai economies are as yet inadequate, considering the fast-growing economic activities in the countries. Some studies on finance-growth nexus focused on the Asian economies have been conducted by Al-Yousif [2002]; Choong et al. [2003]; Vaithilingam, Nair, and Guru [2005]; and Habibullah and Eng [2006]. Taking 30 developing countries (including Malaysia and Thailand) as the case study, Al-Yousif [2002] documented that financial development positively affects economic growth

based on the panel data and time-series analyses. In Malaysia's case, Choong et al. [2003] and Vaithilingam, Nair, and Guru [2005] examined the finance-growth nexus from the perspectives of the stock market and the banking sector. Adopting a similar approach, autoregressive distributed lag (ARDL) technique, the former study found that the stock market tended to stimulate growth during the period 1978-2000, while the positive effect of the banking sector on growth is found by the latter study during the period 1976-1999. Finally, by employing generalized method of moments (GMM) technique on their panel data of 13 Asian developing countries for the period 1990-1998, Habibullah and Eng [2006] found the existence of the supply-leading growth hypothesis. Their findings generally imply that financial intermediation promotes economic growth, hence the policy of liberalization and financial reforms adopted by these Asian countries has spurred economic growth.

Reviewing earlier studies on the finance-growth nexus conducted either in the emerging or advanced economies, researchers hold different views on the existence and direction of causality between the two. Earlier studies on this issue documented mixed and inconclusive findings, which could be due to a number of reasons. Examining the finance-growth nexus by adopting different methods, sets of data, and samples of the study may have led to inconsistent findings. This study aims to reexamine the short- and long-run relationships between financial development and economic growth in the Malaysian and Thai economies following the 1997 Asian financial crisis by adopting the latest technique, ARDL bound testing approach, to test for cointegration. It also attempts to investigate the finance-growth nexus using multivariate causality tests within a vector error correction model (VECM). Finally, the paper also seeks to explore the relative strength of the variables in affecting economic growth using the variance decompositions (VDCs) and the impulse-response functions (IRFs) based on the structural vector autoregression (VAR) framework. Although the first two objectives of this study have been examined by Al-Yousif [2002], Choong et al. [2003], Vaithilingam, Nair, and Guru [2005], and Habibullah and Eng [2006] using different approaches, the last objective of the study falls beyond the scope of their studies.

The rest of the paper is organized as follows. Section 2 discusses the theoretical issues on the finance-growth nexus. The framework and data used in the study are explained in section 3. The results and discussion of the findings are presented in section 4. Finally, section 5 summarizes the main findings and gives some policy implications.

2. Theoretical underpinnings

The connection between financial development and economic growth has been a subject of considerable interest in economic and finance literatures in recent years. In this framework, financial development is considered the principal input for economic growth. It is an important element affecting economic growth rate by altering productivity growth and the efficiency of capital. It also affects the accumulation of capital through its impact on the savings rate by altering the proportion of savings (Pagano [1993]; Levine [1997]). Theoretical support can be traced back to the work of Schumpeter [1912] in which he argued that the financial sector alters the mobilization of savings by managing risks, monitoring managers, and facilitating transactions that in turn improve technological innovation and economic development. In their seminal works, McKinnon [1973] and Shaw [1973] believed that financial liberalization would increase savings and capital accumulation, which will finally be invested and therefore enhance growth.

Of late, the development theory of economic growth has been widely used in the study of economic development, macroeconomics, and other related subjects. Some of these theories were introduced by Rostow [1960], Harrod [1939], Domar [1946], Lewis [1954], and Solow [1956]. However, only few of these theories focused explicitly on the role of financial development in promoting economic growth. On the one hand, Harrod [1939] and Domar [1946] said that to increase growth rate, new investments representing net additions to the capital stock are necessary, thus the national savings ratio and national output ratio determine the rate of growth.[1] On the other hand, Solow [1956], in his neoclassical theory of growth, expanded Harrod-Domar's theory of growth by adding a second factor—labor—and introducing a third independent variable—technology—to the growth equation.[2]

Later studies, both theoretical and empirical, have attempted to deepen our understanding of the different aspects of the finance-growth nexus by exploring the relationship, direction of causality, and the channel of

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[1] The model explains that economies must save and invest a certain proportion of their gross national product; the more savings and investments, the faster economies can grow. The model has also been criticized. For a more detailed explanation, see Todaro [2000].

[2] In this model, Solow [1956] used the standard aggregate production function in which $Y=Ae^{\mu t}K^{\alpha}L^{1-\mu}$, where Y is gross domestic product, K is stock of human and physical capital, L is unskilled labor. A is a constant that reflects the base level of technology, and $e^{\mu t}$ reflects the constant exogenous rate at which technology grows over time t. For a more detailed explanation, see Todaro [2000].

transmission between the variables. Although many papers have been written on this issue that focused on advanced economies, no similar studies have been done on the Malaysian and Thai economies. In their surveys of existing literature, Thakor [1996] and Levine [1997] found that there have been four notable streams of thought on finance-growth nexus. The first is the "finance-led growth hypothesis" or the "supply-leading view". This postulates the supply-leading relationship between financial and economic developments [Patrick 1966]. According to this view, the existence of the financial sector, as well-functioning financial intermediations in channelling the limited resources from surplus units to deficit units, would provide efficient allocation of resources, thereby leading other economic sectors in their growth process. This view has received considerable support from recent studies (Greenwood and Jovanovic [1990] and Habibullah and Eng [2006], to name a few).

The second is the "growth-led finance hypothesis" or the "demand-following view". This view, advanced by Robinson [1952], states that financial development follows economic growth; or where enterprise leads, finance follows. Accordingly, as the real side of the economy expands, its demand for certain financial instruments, arrangements, and markets increases, leading to the growth of these services. Support for this view can be found, for example, in the studies of Friedman and Schwartz [1963] and Demetrides and Hussein [1996].

The third is the "feedback hypothesis" or "bidirectional causality view". This postulates that finance and economic developments are mutually causal—that is, they have bidirectional causality. This hypothesis asserts that a country with well-developed financial system could promote high economic expansion through technological changes, and product and service innovations [Schumpeter 1912]. This, in turn, will create high demand for financial arrangements and services [Levine 1997]. As the banking institutions respond to these demands, changes will stimulate higher economic achievement. Both financial and economic developments are thus positively interdependent, and their relationships could lead to bidirectional causality [Choong et al. 2003]. Support for this view can also be found, for example, in the works of Greenwood and Smith [1997] and Luintel and Khan [1999].

The fourth is the "independent hypothesis". This was originally put forward by Lucas [1988], who argued that financial development and economic growth are not causally related. Meanwhile, Chandavarkar [1992] noted that "none of the pioneers of development economics ... even list finance as a factor of development".

It is obvious that literature on the issues is mixed and inconclusive. Accordingly, it is appropriate and timely to reexamine the relationship between financial development and economic growth in the Malaysian and Thai economies. Which view does the finance-growth nexus in these countries support? To what extent is financial development significant in promoting economic growth in these economies? By adopting the ARDL bound testing approach, VECM, VDCs, and IRFs, this study will probe this issue in the Malaysian and Thai economies after the 1997 financial crisis.

3. Data and empirical framework

This study is carried out on a quarterly basis from 1998 to 2006.[3] All the data employed in this study are obtained from the International Financial Statistic (IFS) report published by the IMF. As for financial development measurement, the study uses financial depth (FD), following the study of Christopoulos and Tsionas [2004]. Finance depth is the ratio of total bank deposit liabilities to nominal gross domestic product (GDP). The study also includes share of investment (SI) as ancillary variable. The share of investment is the share of gross fixed capital formation to nominal GDP. Meanwhile, economic growth (GDP) is proxied by real GDP. Since price stability is believed to have great impact on the Malaysian and Thai economies, the inflation rate is included in the study as another ancillary variable to avoid simultaneity bias [Gujarati 1995]. In this study, inflation (INF) is measured by the changes in consumer price index (CPI).

3.1. Autoregressive distributed lag bound testing approach

In this study, the short- and long-run dynamic relationships between economic growth and financial depth are estimated by using the newly proposed ARDL bound testing approach, which was initially introduced by Pesaran, Shin, and Smith [1996]. The ARDL has numerous advantages. First, unlike the most widely used method for testing cointegration, the ARDL approach can be applied regardless of the stationary properties of the variables in the samples. It also allows for inferences on long-run estimates, which is not possible under alternative cointegration procedures. In other words, this procedure can be applied regardless of whether the series are $I(0)$, $I(1)$, or fractionally integrated (Pesaran and Pesaran [1997]; Bahmani-Oskooee and Ng [2002]), thus avoiding

[3] The study period, the post-1997 financial crisis period, was chosen based on data availability.

problems resulting from nonstationary time-series data [Laurenceson and Chai 2003]. Second, the ARDL model takes sufficient numbers of lags to capture the data-generating process in a general-to-specific modeling framework [Laurenceson and Chai 2003]. It estimates $(p+1)^k$ number of regressions to obtain optimal lag-length for each variable, where p is the maximum lag, and k is the number of variables in the equation. Finally, the ARDL approach provides robust results for a smaller sample size in cointegration analysis. The sample size of our study is 36, which motivated the study to adopt this model.

The ARDL model used in this study can be written as follows:

$$GDP_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 SI_t + \alpha_3 INF_t + e_t \quad (1)$$

where

GDP_t is real output at time t
FD_t is a measure of financial depth
SI_t is the share of investment
INF_t is inflation
e_t is an error term

The error correction version of ARDL framework pertaining to the variables in equation (1) can be reproduced as follows:

$$\Delta GDP_t = \delta_0 + \sum_{i=1}^{p} \varepsilon_i \Delta GDP_{t-i} + \sum_{i=0}^{p} \phi_i \Delta FD_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta SI_{t-i} + \sum \gamma_i \Delta INF_{t-i}$$

$$+ \lambda_1 GDP_{t-1} + \lambda_2 FD_{t-1} + \lambda_3 SI_{t-1} + \lambda_4 INF_{t-1} + u_{1t} \quad (2)$$

The terms with summation signs in equation (2) represent the error correction dynamic while the second part (term with λs) corresponds to the long-run relationship. The null of no cointegration in the long-run relationship, defined by H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$, is tested against the alternative, H_0: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$, through the familiar F-test. However, the asymptotic distribution of this F-statistic is nonstandard, regardless of whether the variables are $I(0)$ or $I(1)$. For a small sample size study ranging from 30 to 80, Narayan [2004] tabulated two sets of appropriate critical values. One set assumes that all variables are $I(1)$, and another assumes that they are all $I(0)$. This provides

a bound that covers all possible classifications of the variables into $I(1)$ and $I(0)$ or even fractionally integrated. If the F-statistic exceeds the upper-bound level, the null hypothesis is rejected, indicating the existence of cointegration. Conversely, if the F-statistic falls below the bound level, the null hypothesis cannot be rejected, which means that no cointegration exists. If, however, it falls within the band, the result is inconclusive.

Finally, to determine the optimal lag-length incorporated into the model and select the ARDL model to be estimated, the study employs the Akaike information criteria (AIC). Since our study utilizes quarterly data with only 36 observations, the possible optimal lag-length to be considered is only four.

3.2. Vector error correction model framework

To examine the multivariate causality relationship between the variables, the study employs the VECM framework. The VECM regresses the changes in both dependent and independent variables on lagged deviations. The multivariate causality test based on VECM can thus be formulated as follows:

$$\Delta Z_t = \delta + \Gamma_t \Delta Z_{t-1} + \ldots\ldots + \Gamma_k \Delta Z_{t-k} + \Pi Z_{t-k} + \varepsilon_t \qquad (3)$$

where Z_t is an $n \times 1$ vector of variables and δ is an $n \times 1$ vector of constant

In our case, $Z_t = (GDP, FD, SI, INF)$. Γ is an $n \times n$ matrix (coefficients of the short-run dynamics), $\Pi = \alpha\beta'$ where α is an $n \times 1$ column vector (the matrix of loadings) that represents the speed of short-run adjustment to disequilibrium and β' is an $1 \times n$ cointegrating row vector (the matrix of cointegrating vectors) that indicates the matrix of long-run coefficients such that Y_t converge in their long-run equilibrium. Finally, ε_t is an $n \times 1$ vector of white-noise error term and k is the order of autoregression.

A test statistic is calculated by taking the sum of the squared F-statistics of Γ and t-statistics of Π. The multivariate causality test is implemented by calculating the F-statistics (Wald-test) based on the null hypothesis that the set of coefficients (Γ) on the lagged values of independent variables are not statistically different from zero. If the null hypothesis is not rejected, then it can be concluded that the independent variables do not cause the dependent variable. On the other hand, if Π is significant (that is, different from zero) based on the t-statistics, then the independent and dependent variables have a stable relationship in the long run.

From equation (3), two channels of causation may be observed. The first channel is the standard Granger test, examining the joint significance of the coefficients of the lagged independent variables. The second is the adjustment of the dependent variable to the lagged deviations from the long-run equilibrium path, represented by the error correction term (ECT). If the ECT is found to be significant, it substantiates the presence of cointegration as established in the system earlier; at the same time, it tells us that the dependent variable adjusts toward its long-run level. From these tests, we can reveal four patterns of causal interactions between pairs of the variables: (a) a unidirectional causality from a variable, say, x, to another variable, say, y; (b) a unidirectional causality from y to x; (c) a bidirectional causality; and (d) an independent causality between x and y.

3.3. Variance decompositions and impulse-response functions

To further investigate the interaction between the variables, the study generates VDCs and IRFs, besides the above battery of time-series techniques. VDCs enable us to examine the out-of-sample causality among variables in the VAR system. It measures the percentage of the forecast error of a variable that is explained by another variable. It precisely indicates the relative impact of one variable on another. At the same time, it provides information on how a variable of interest responds to shocks or innovations in other variables. In our context, it allows us to explore the relative importance of financial development in accounting for variations in economic growth. To interpret economic implications from VDC findings, Sim's [1980] innovation accounting procedure is employed, which involves the decomposition of forecast error variance of each variable into components attributable to its own innovations and to shocks of other variables in the system.

On the other hand, IRFs, also known as innovation accounting, allow us to trace temporal responses of variables to their own shocks and those in other variables. In our context, from the IRFs we can assess the direction, magnitude, and persistence of economic-growth responses to innovations in financial development and inflation.

4. Empirical results

Before estimating the short- and long-run relationships between financial development and economic growth for the Malaysian and Thai economies, we have to decide on the lag-length on the first-differenced variables. Bahmani-Oskooee and Bohl [2000] have shown that the results of this first step are

usually sensitive to lag-length. To verify this, we incorporate lag-length equal to 1 to 4 on the first-differenced variables.

The computed F-statistics for each lag-length, along with the critical values, are reported in Table 1. As reported, the significance levels for these countries vary with the choice of lag-length. For Malaysia, only lag-lengths = 2 and 3 are found to be significant at 90 percent and 95 percent levels, respectively, while the lag-lengths = 1 and 4 are not. With the exception of lag-length = 4, all the other lag-lengths, = 1, 2, and 3, are found to be significant at least at 95 percent level for Thailand. The results seem to give evidence for the existence of a long-run relationship among economic growth, financial depth, share of investment, and inflation in Malaysia and Thailand. In other words, these variables are found to have a long-run equilibrium in which the variable tends to move together in the long run. These results should be considered preliminary and indicate that in estimating equation (1) we must retain the lagged level of variables.

Table 1. F-statistics for testing the existence of a long-run growth equation

Lag-Length	*F-Statistics*	
	Malaysia	*Thailand*
1	1.7958	3.4099**
2	2.5761*	5.7778***
3	4.1525**	7.9124***
4	0.25502	1.6687

Note: The relevant critical value bounds are taken from Narayan [2004] (case 2 with a restricted intercept and no trend and number of regressors = 3 from). They are 4.480 – 5.700 at 99 percent; 3.170 – 4.160 at 95 percent; and 2.618 – 3.502 at 90 percent significance levels, respectively. *, **, and *** denote that F-Statistics fall above the 90 percent, 95 percent, and 99 percent upper bound, respectively.

In the second stage, we retain the lagged level of variables and estimate equation (2) using the Akaike information criterion (AIC) lag-length selection criteria. Based on the F-statistic values, the maximum lag-length is set at 3. The long-run ARDL model estimates, selected based on the AIC criteria, are reported in Table 2. Based on ARDL [2, 1, 2, 1], we find that except for share of investment, all other variables are found to significantly promote economic growth in Malaysia. Based on ARDL [2, 2, 0, 0], Thai economic growth is found to be positively affected by financial development and price stability.

Table 2. The long-run ARDL model estimates

Country	*Malaysia* *[2,1,2,1]*	*Thailand* *[2,2,0,0]*
C	7.7892*** (5.2776)	1.6952*** (14.3626)
FD	1.7481** (2.2325)	.00839* (1.7916)
SI	-3.9361 (-1.1143)	.61476*** (3.5825)
INF	2.3031*** (8.4321)	.039192** (2.10802)
	Adj-R^2 =.95195 D-W = 2.3216	Adj-R^2 = .96250 D-W = 2.4762

Note: *, **, and *** denote 10 percent, 5 percent and 1 percent significance, respectively. Figures in the parentheses and squared parentheses are the *t*-statistics values and the selected ARDL model. D-W denotes Durbin-Watson test for autocorrelation.

Thus the common sources of economic progress/regress in Malaysia and Thailand were price stability and financial development

Our findings of the positive finance-growth relationships for both countries are compatible with many earlier studies (e.g., Christopoulos and Tsionas [2004] for Thailand during 1970-2000; Habibullah and Eng [2006], Choong et al. [2003], and Vaithilingam, Nair, and Guru [2005] for Malaysia during different periods, from 1976 to 2000). Furthermore, the relatively lower rate of inflation in these countries during the period compared to other ASEAN-4 economies has intensified economic growth.[4] Earlier studies showed that countries with low inflation rate, i.e., below 10 percent annually, enjoy accelerated economic growth (Bekaert, Harvey, and Lundblad [2005]; Hung [2003]); while countries with high inflation, i.e., 10-20 percent a year, could hurt long-run economic

[4] See, for example, the IMF report for the year 2005. The average rate of inflation of Malaysia was 2.96 percent while that of Thailand was 4.54 percent. With the exception of the inflation rates in Singapore (0.47 percent) and Brunei Darussalam (1.22 percent), the rates of inflation in the rest of ASEAN countries were higher than that of Thailand: Cambodia (5.56 percent), Laos PDR (7.17 percent), the Philippines (7.64 percent), Vietnam (8.25 percent), Myanmar (9.37 percent), and Indonesia (10.45 percent).

growth [Gylfason and Herbertsson 2001; Andrés, Hernando, and Lopez-Salido 2004]. This implies that in order to promote growth, the governments in these countries must maintain a lower rate of inflation (below two digits).

Our findings on the finance-growth nexus seem to indicate that following the 1997 financial crisis, the Malaysian and Thai authorities successfully enhanced their financial sector and controlled price stability by speeding up economic growth. This indicates that Malaysian and Thai policymakers should maintain and enhance the current practices of their banking sectors and stock markets.

After exploring the long-run association between economic growth and measures of financial development, we proceed to multivariate Granger causality test based on VECM. At this point, it is important to note that the documented cointegration between the variables suggests only their long-run association and, while it implies causality, does not reveal the directions of causation among them. Table 3 reports the multivariate causalities between economic growth (GDP), financial depth, and two other ancillary variables: share of investment (SI) and inflation (INF).

It is interesting to note that both error correction terms (ECTs) and short-run channels of Granger causality were temporarily active for our main models (i.e., when GDP is considered a dependent variable) for Malaysia and Thailand. The significance of ECTs, at least for our main models, confirms the existence of long-run relationship between the variables as documented in earlier ARDL models, i.e., ARDL [2, 1, 2, 1] for Malaysia and ARDL [2, 2, 0, 0] for Thailand. Specifically, this implies that deviations from the long-run equilibrium relationships in the Malaysian and Thai economies are mainly caused by the changes in GDP. In other words, the GDP bears the brunt of short-run adjustment to the long-run equilibrium.

We also note that there are only two short-run dynamic interactions between the variables for the Malaysian equation. We find a bidirectional causation between GDP and SI. This indicates that, in the short run, the development of the Malaysian economy hinges crucially on the performance of the investment. Accordingly, while we do not find the long-run causality between GDP and SI in Malaysia (see Table 2), there exist short-run interactions between them (see Table 3). Finally, we also find a unidirectional causation running from GDP to INF for Malaysia. At this jucture, it is interesting to note that economic growth leads the price to rise in the Malaysian economy. This type of inflation is categorized under the demand-pull inflation. Higher income leads to the higher purchasing power of the citizens, thereby driving the demand for more goods

Table 3. Multivariate VECM causality

Dependent variables		*Independent variables*				
		ΔGDP	*ΔFD*	*ΔSI*	*ΔINF*	ECT_{t-1}
Malaysia	ΔGDP	--	0.8378** [0.0460]	5.0694*** [0.0081]	0.751915 [0.4832]	-0.1969** (-2.6202)
	ΔFD	0.9655 [0.4266]	-	0.5776 [0.6358]	1.5509 [0.2344]	0.1010 (1.5771)
	ΔSI	6.7934*** [0.0021]	1.7017 [0.2055]	-	1.3949 [0.2689]	0.1021 (1.2543)
	ΔINF	5.6664*** [0.0049]	1.4828 [0.2488]	0.7050 [0.5594]	-	-1.2379 (-0.9070)
Thailand	ΔGDP	--	3.3738* [0.0749]	1.7714 [0.1957]	1.0811 [0.3088]	-0.1896** (-2.2609)
	ΔFD	6.2808*** [0.0027]	-	0.0456 [0.8327]	1.6271 [0.2143]	-6.5886 (-0.6431)
	ΔSI	1.7114 [0.1913]	1.4930 [0.2417]	-	0.3608 [0.5537]	0.1865 (0.9933)
	ΔINF	0.8687 [0.4709]	1.4206 [0.2612]	0.0072 [0.4709]	-	1.3983 (0.2240)

Note: ***, **, and * represent significance at the 1 percent, 5 percent, and 10 percent levels, respectively. ECT_{t-1} is derived by normalizing the cointegrating vectors on the GDP as proxy for economic growth, producing the residual *r*. By imposing restriction on the coefficients of each variable and conducting Wald test, we obtain *F*-statistics for each coefficient in all equations. Figures in the parentheses and squared parentheses represent *t*-statistics and probabilities for *F*-statistics, respectively.

and services. As for the Thai economy, only one short-run interaction exists between the variables, i.e., a bidirectional causality between GDP and FD.

For Malaysia, the short-run causality stemming from financial development to economic growth is in favor of the "finance-growth-led hypothesis" or the "supply-leading view". This implies that financial institutions can be viewed as an effective leading sector in channelling and transferring financial resources between surplus and deficit units in the Malaysian economy. This particular result echoes the findings of Choong et al. [2003] and Habibullah and Eng [2006] on the Malaysian economy during the periods 1978-2000 and 1990-

1998, respectively. Meanwhile, the bidirectional causality between financial development and economic growth in the Thai economy supports the "feedback hypothesis" or "bidirectional causality view". According to this view, the Thai financial system has promoted high economic expansion through technological changes, and product and service innovations. This, in turn, will create high demand for financial arrangements and services. As financial institutions effectively respond to these demands, the changes will stimulate higher economic achievement. Both financial and economic developments are thus positively interdependent, and their relationships could lead to bidirectional causality.

To further explore the dynamic interaction between financial development and economic growth, the study proceeded to test the variance decompositions and impulse-response functions. The results of VDC (see Table 4) provide detailed information on the relative strength of the financial depth, share of investment, and inflation in explaining the changes in economic growth. From the VDC and IRF results, we captured the relative importance of various shocks to and their influences on economic growth. The VDCS and IRFs are simulated by orthogonalizing the innovations in the vector autoregression equations using the so-called Cholesky decomposition suggested by Sim [1980], with the ordering of the variables: GDP, FD, SI, INF.[5] Based on VDC results for the

Table 4. Variance decompositions

Horizon (Quarterly)		*Explained by shocks in:*			
		GDP	*FD*	*SI*	*INF*
Malaysia	1	100.00	0.00	0.00	0.00
	2	93.15	2.33	2.46	2.06
	4	91.50	3.58	2.84	2.08
	8	85.09	11.02	2.42	1.47
	12	80.20	16.33	2.30	1.17
Thailand	1	100.00	0.00	0.00	0.00
	2	95.92	0.07	2.85	1.21
	4	92.36	0.69	5.22	1.73
	8	90.25	0.91	6.59	2.25
	12	89.06	1.06	7.55	2.33

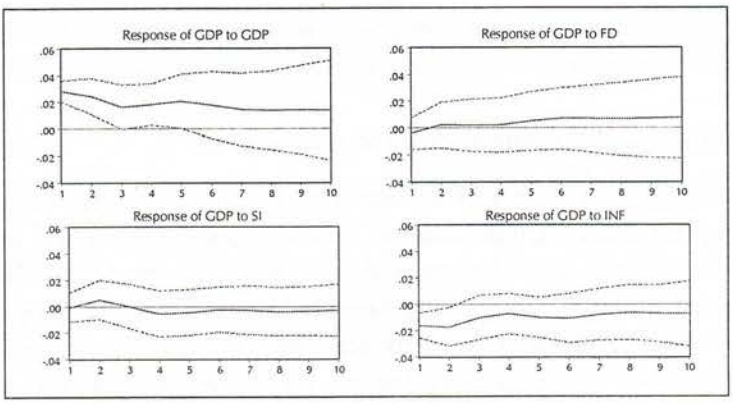
[5] We also tried to use different orderings of variables, such as GDP, FD, INF, SI; GDP, INF, SI, FD; and GDP, INF, FD, SI. We also tried to employ the generalized impulses, which do not depend on the VAR ordering, as described by Pesaran and Shin [1998]. However, their results are very much similar.

horizon of 1-12 quarters, we find that the variations in the Malaysian economic growth respond more to shocks in the financial depth, accounting for 0-16 percent of economic growth forecast error variance. On the other hand, the variations in economic growth in Thailand respond more to shocks in the share of investment, accounting for 0-8 percent of economic growth forecast error variance after three years. The variations in economic growth in these countries, however, rely more on their own innovations. This finding seems to support the short-run dynamic causalities between the variables examined in the study.

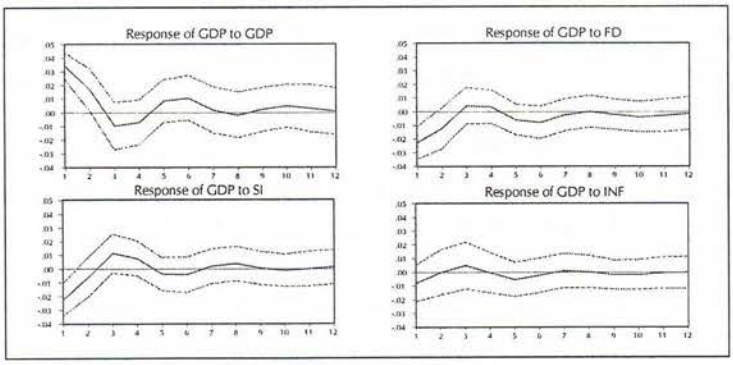
To complement our analysis on the VDCs, we generated the IRFs. As reported in Figure 1, the overall results seem to be very much consistent with

Figure 1. Generalized impulse-responses functions

Malaysia



Thailand



our earlier findings. Economic growth seems to have immediate negative response to shocks in the price stability and share of investment, while no significant effect is found between the shocks in the financial development and the innovations in the economic growth of Malaysia. On the other hand, the economic growth in Thailand seems to have immediate response to shocks in the financial depth and share of investment. This further implies that policies pertaining to price stability and investment in Malaysia and policies concerning investment and financial development should at least be noted by the governments in order to speed up their economic growth.

Finally, we performed the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) stability tests for our chosen ARDL models. Figure 2 provides the plots of the CUSUM and CUSUMSQ stability tests for each country. From the figures, we find that the plots of CUSUM and CUSUMSQ statistics remain within the critical bounds at 5 percent significance level. This implies that all coefficients in the error correction model are stable over the time. The selected models adopted in the study seem to be good enough and robust in estimating the short- and long-run relationships between financial development and economic growth.

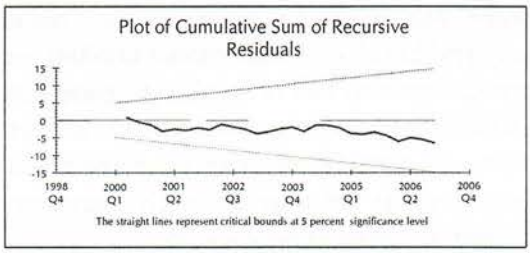
5. Conclusion and some policy implications

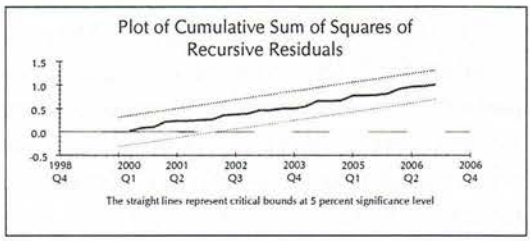
By employing a battery of statistical tests, this paper explored the short- and long-run relationships between financial development and economic growth in Malaysia and Thailand following the 1997 financial crisis. It also investigated the dynamic causality between the variables using vector error correction model, reexamined the model in level form, and generated variance decompositions and impulse-response functions to further assess their interactions. Based on the specified ARDL models, the paper finds a long-run equilibrium between economic growth, finance depth, share of investment, and inflation. The study also found that the common sources of economic progress/regress in these countries are price stability and financial development. Specifically, this implies that in promoting economic growth in these countries, it is very important for the governments to preserve price stability by reducing the rate of inflation and maintaining it below two digits.

In terms of the dynamic causalities between variables, the study documents the unidirectional causality stemming from financial development to economic growth. This evidence favors the "finance-growth-led hypothesis" or "supply-leading view". This implies that financial institutions can be viewed as an effective leading sector in channelling and transferring the financial resources

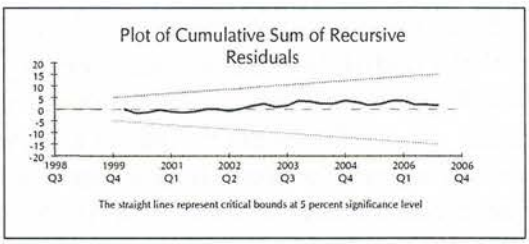
Figure 2. CUSUM and CUSUMSQ plots

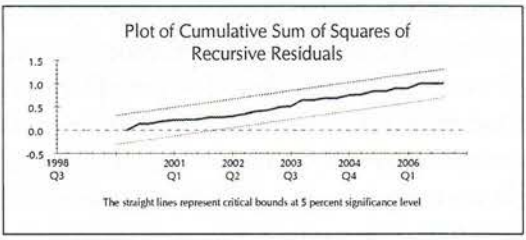
Malaysia





Thailand





between surplus and deficit units in the Malaysian economy. This particular result echoes the findings of Choong et al. [2003] and Habibullah and Eng [2006] on the Malaysian economy during the periods 1978-2000 and 1990-1998, respectively. On the other hand, the bidirectional causality between financial development and economic growth in the Thai economy accords with the "feedback hypothesis" or "bidirectional causality view". This proves that the Thai financial system has been able to promote high economic expansion through technological changes, and product and service innovations, which, in turn, drives the demand for financial arrangements. Both financial and economic developments are thus positively interdependent, and their relationship could lead to bidirectional causality.

Based on VDCs and IRFs tests, we find that the variations in economic growth respond more to shocks in financial depth (for Malaysia) and investment (for Thailand), accounting for 0-18 percent of economic growth forecast error variance after 12 quarters. Economic growth seems to have immediate negative response to shocks in price stability and share of investment, while no significant effect is found between shocks in the financial development and the innovations in the economic growth of Malaysia. On the other hand, economic growth in Thailand seems to have immediate response to shocks in the financial depth and share of investment. This implies that policies pertaining to price stability, financial development, and investment should be noted by the governments of Malaysia and Thailand to speed up the countries' economic growth.

The findings of this study also show that the results are country-specific and tend to vary with the kind of financial institutions existing in the countries. This can be attributed to the fact that these countries differ in their level of financial development due to differences in policies and institutions. These findings accord with the view of the World Bank—that economic policies are country-specific and their success is a function of the institutions that implement them [World Bank 1993].

The most important implication of our findings is a policy recommendation: if policymakers want to promote growth, then attention should be focused on long-run policies—for example, the enhancement of existing modern financial institutions both in the banking sector and the stock market. The government, therefore, needs to further enhance the banking sector and provide an environment conducive for investors to allocate the assets in the stock markets. Enhancing the financial sector—banking and stock market—is an important factor that must be considered in order to speed up economic growth.

Finally, to enhance and enrich the findings of the study, more robust analysis is needed. Further researches recommended in this context involve comparing the analyses of the pre- and post-1997 crisis periods. Additionally, the findings could be enriched by including more countries into the analysis, for example, all ASEAN countries. A comparative study between the emerging economies (such as Malaysia's and Thailand's) and the developed markets would provide additional insights into the study.

References

Al-Yousif, Y.K. [2002] "Financial development and economic growth: another look at the evidence from developing countries", *Review of Financial Economics* **11**: 131-150.

Andrés, J., I. Hernando, and J.D. Lopez-Salido [2004] "The role of the financial system in the growth-inflation link: the OECD experience", *European Journal of Political Economy* **20**: 941-961.

Bahmani-Oskooee, M. and M.T. Bohl [2000] "German monetary unification and the stability of the German M3 money demand function", *Economics Letters* **66:** 203-208.

Bahmani-Oskooee, M. and R.C.W. Ng [2002] "Long-run demand for money in Hong Kong: an application of the ARDL model", *International Journal of Business and Economics* **1**(2): 147-155.

Bekaert, G., C.R. Harvey, and C. Lundblad [2005] "Does financial liberalization spur growth?" *Journal of Financial Economics* **77**(30): 3-55.

Chandavarkar, A. [1992] "Of finance and development: neglected and unsettled questions", *World Development* **22**: 133-142.

Choong, C. K., Z. Yusop, S.H. Law, and V.L.K. Sen [2003] "Financial development and economic growth in Malaysia: the stock market perspective", *Economic Working Paper* Archive at WUSTL – Macroeconomics.

Christopoulos, D.K. and E.G. Tsionas [2004] "Financial development and economic growth: evidence from panel unit root and cointegration tests", *Journal of Development Economics* **73**: 55-74.

Demetriades, P.O. and A.K. Hussein [1996] "Does financial development cause economic growth?: time series evidence from 16 countries", *Journal of Development Economics* **51**: 387-411.

Domar, E. [1946] "Capital expansion, rate of growth, and employment", *Econometrica* **14**(2): 137-147.

Friedman, M. and A.J. Schwartz [1963] *A monetary history of the United States.* Princeton, NJ: Princeton University Press.

Goldsmith, R.W. [1969] *Financial structure and development.* New Haven, CT: Yale University Press.

Greenwood, J., and B. Jovanovic [1990] "Financial development, growth, and the distribution of income", *Journal of Political Economy* **98**(5): 1076-1108.

Greenwood, J. and B. Smith [1997] "Financial markets in development, and the development of financial markets", *Journal of Economic Dynamics and Control* **21**: 145-181.

Gujarati, D. [1995] *Basic econometrics.* New York: McGraw-Hill.

Gylfason, T. and T.T. Herbertsson [2001] "Does inflation matter for growth?" *Japan and World Economy* **13**: 405-428.

Habibullah, M.Z. and Y.K. Eng [2006] "Does financial development cause economic growth?: a panel data dynamic analysis for Asian developing countries", *Journal of the Asian Pacific Economy* **11**(4): 377-393.

Harrod, R. [1939] "An essay in dynamic theory", *The Economic Journal* **49**(193): 14-33.

Hung, F.S. [2003] "Inflation, financial development, and economic growth", *International Review of Economics and Finance* **12**: 45-67.

International Monetary Fund (IMF) [2006] International Financial Statistic website, www.imfstatistics.org.

Khan, S.M. and A.S. Senhadji [2000] "Financial and economic growth: an overview", IMF Working Paper, International Monetary Fund, Washington.

Laurenceson, J and J.C.H. Chai [2003] *Financial reform and economic development in China.* Cheltenham, UK: Edward Elgar.

Levine, R. [1997] "Financial development and economic growth: views and agenda", *Journal of Economic Literature* **35**(2): 688-726.

Lewis, W.A. [1954] "Economic development with unlimited supplies of labour", *The Manchester School* **22**: 139-191.

Lucas, R.E. [1988] "On the mechanics of economic development", *Journal of Monetary Economics* **22**(1):3-42.

Luintel, B.K. and M. Khan [1999] "A quantitative re-assessment of the finance-growth nexus: evidence from multivariate VAR", *Journal of Development Economics* **60**: 381-405.

McKinnon, R.I. [1973] *Money and capital in economic development.* Washington, D.C.: The Brooking Institution.

Mussa, M. [2006] "Global economic prospects 2006/2007: continued solid growth in 2006, rising risks for inflation, financial markets and growth for 2007", Paper presented at the ninth semi-annual meeting on Global Economic Prospects, Washington, D.C., April 11.

Narayan, P.K. [2004] "Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji", Discussion Paper No. 02/04, Department of Economics, Monash University. Australia.

Pagano, M. [1993] "Financial markets and growth: an overview", *European Economic Review* **37**: 613-622.

Patrick, H.T. [1966] "Financial development and economic growth in underdeveloped countries", *Economic Development and Cultural Change* **14**: 174-189.

Pesaran, M.H. and B. Pesaran [1997] *Working with Microfit 4.0: interactive econometric analysis.* Oxford, Oxford University Press.

Pesaran, M.H. and Y. Shin [1998] "Generalized impulse-response analysis in linear multivariate models", *Economic Letters* **58**: 17-29.

Pesaran, M.H., Y. Shin, and R.J. Smith [1996] "Testing for the existence of a long-run relationship", DAE Working Paper No. 9622. Department of Applied Economics, University of Cambridge.

Robinson, J. [1952] "The generalization of the general theory" in: *The rate of interest and other essays.* London: MacMillan.

Rostow, W.W. [1960] *The stages of economic growth: a non-communist manifesto.* London: Cambridge University Press.

Schumpeter, J.A. [1912] *A theory of economic development.* Cambridge, MA: Harvard University Press.

Schumpeter, J.A. [1932] "Entwicklung," State University of New York at Albany: Special Collections and Archives, SPE XMS Lederer, Box 1, 82.1.

Shaw, E.S. [1973] *Financial deepening in economic growth.* New York: Oxford Univ. Press.

Sim, C.A. [1980] "Macroeconomics and reality", *Econometrica* **48**(1): 1-49.

Solow, R. [1956] "A contribution to the theory of economic growth", *Quarterly Journal of Economics* **70**: 65-94.

Thakor, A.V. [1996] "The design of financial system: an overview", *Journal of Banking and Finance* **20**: 917-948.

Todaro, M.P. [2000] *Economic development.* Seventh edition. United Kingdom: Addison Wesley Longman.

Vaithilingam, S, M. Nair, and B. Guru [2005] "Private sector financing on economic growth in Malaysia: results from the bounds test", *Journal of Academy of Business and Economics*: 1-21.

World Bank [1993] *The Asian miracle: economic growth and public policy.* New York: Oxford University Press.