Chulalongkorn Journal of Economics 19(2), August 2007 : 161-184

Does Financial Development and Inflation Spur Economic Growth in Thailand?

Shabri Majid
Kulliyyah of Economic and Management Sciences,
International Islamic University, Selangor, Malaysia
Corresponding author: mshabri@unsyiah.ac.id

Abstract

The paper empirically examines the short- and long-run dynamics between financial development, inflation and economic growth during the post-1997 financial crisis in Thailand using battery of time series techniques. Based on the ARDL [2, 2, 0, 0], the study documents a long-run equilibrium between finance depth, inflation and growth. Granger causality tests based on the VECM further reveals that there is a bidirectional causality between finance-growth in Thailand, the finding accords with "the feedback hypothesis" or "bidirectional causality view". Based on the VDCs and IRFs, the study discovers that the variations in the economic growth rely very much on its own innovations. To promote growth in the country, priority should be given for long run policies, i.e., the enhancement of existing financial institutions both in the banking sector and stock market and the preservation of low rate of inflation.

Keywords: Financial Development, Inflation, Growth, ARDL, Multivariate Causality, Impulse-response Functions

1. Introduction

After being hit by the 1997 financial turmoil, the economy of Thailand has now been virtually recovered. Based on the International Monetary Fund (IMF) Report (2006), the growth rate of Thai economy is 5 percent. The growth rate of Thailand is below the ASEAN average growth rate which is 5.8 percent. Comparing to other larger emerging economies such as India and China, the growth rates of the Thai economy is however slightly higher (Mussa, 2006). Why does the economic growth of the country grow at different rates? Although this fundamental question has been raised by researchers in the area of economic development for the case of developed economies since early 1930s, but it is still relevant in today's context of the Thai economy. The empirical growth literature has come up with numerous plausible explanations of 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).

Of those possible factors contributing to economic growth, the role of financial sector has begun to receive attention more recently. Initially, the recognition of a significant relationship between financial development and economic growth dates back as least 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 in the historical literature on economic growth and finance. The pioneering studies on this area such as Goldsmith (1969), Schumpeter (1932) and more recently of McKinnon (1973) and Shaw (1973) documented positive relationship 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, that is they have a bidirectional causality.

Albeit voluminous studies on finance-growth nexus in the advanced economies have been carried out, the similar studies on the ASEAN economies are inadequate considering the vast-growing economic activities in the region. Among the studies on finance-growth nexus focused on the Asian economies have been conducted by Al-Yousif (2002), Choong *et al*. (2003), Vaithilingam *et al*. (2005) and Habibullah and Eng (2006). Taking 30 developing countries (including 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. For Malaysian case, Choong *et al*. (2003) and Vaithilingam *et al*. (2005) examined the finance-growth nexus from the perspectives of the stock market and banking sector, respectively. By adopting similar approach, ARDL technique the former study found that the stock market tends to stimulate growth during the period 1978-2000, while the positive effect of the banking sector on growth is found by the latter study during the period 1976-1999. Finally, by employing 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 finding generally implies that financial intermediation promotes economic growth; thereby the policy of liberalization and financial reforms adopted by these Asian countries has improved economic growth.

Referring to earlier studies conducted either in the emerging or advanced economies on finance-growth nexus, economists hold different views on the existence and direction of causality between financial development and economic growth. Earlier empirical studies documented mixed and inconclusive findings. This could be partly due to a number of reasons. Examining the finance-growth nexus by adopting different methods, sets of data, and samples of the study may

lead to the inconsistent findings. In other words, the findings of earlier studies on finance-growth nexus are country specific and tend to vary with the kind of financial institutions exist in the countries. This can be attributed to the fact that the countries differ in their level of financial development due to differences in policies and institutions and their success is a function of the institutions that implement them (World Bank, 1993). This study is, therefore, aimed at empirically re-examining the short- and long-run relationships between financial development, inflation and economic growth in the Thai economy during the post-1997 Asian financial turmoil by adopting the latest technique, autoregressive distributed lag (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.

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

2. Theoretical Underpinnings

The association between the financial development and economic growth has been a subject of considerable interest in the development of economic and finance literatures in recent years. In this framework, financial development is considered to be the principal input for economic growth. It is an important element to affect the rate of economic growth by altering productivity growth and the efficiency of capital. It also affects the accumulation of capital through its

impact on the saving rate by altering the proportion of saving (Pagano, 1993; and Levine, 1997). The theoretical support can be traced back to the work of Schumpeter (1912) where he argued that financial intermediaries sector alter the mobilizing of saving for the successful projects by managing risk, monitoring managers, and then facilitating transaction which are essentially improve technological innovation and economic development. In their seminal works, McKinnon (1973) and Shaw (1973) believed that the financial liberalization will increase savings, capital accumulation which finally to be invested and therefore enhance growth.

Of late, the development theory of economic growth has been widely used as literature in the study of economic development, macroeconomic 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 focussed explicitly on the role of financial development in promoting economic growth. On one hand, Harrod (1939) and Domar (1946) opined that to increase a growth rate, new investments representing net additions to the capital stock are necessary, thus the national saving ratio and national output ratio determine the rate of growth.[1] On the other hand, in his neoclassical theory of growth, Solow (1956) expanded the Harrod-Domar's theory of growth by adding a second factor, labour, 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

---

[1] The model explains the economies must save and invest a certain proportion of their GNP, the more saving and investment, the faster economies can grow. The model also has received some critics. For a more detailed explanation, see Todaro (2000).

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

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

The second one is "the growth-led finance hypothesis" or "the demand-following view". This view was advanced by Robinson (1952) and it 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 and arrangements and the financial markets increases, leading to the growth of these services. Empirical support for this second view can be found, for examples, in the studies of Friedman and Schwartz (1963) and Demetrides and Hussein (1996).

The third view is "the feedback hypothesis" or "the bidirectional causality view". This view postulates that the finance and economic developments are mutually causal, that is they have bidirectional causality. In this hypothesis, it is asserted that a country with well-developed financial system could promote high economic expansion through technological changes, product and services innovation

(Schumpeter, 1912). This in turn, will create high demand on the financial arrangements and services (Levine, 1997). As the banking institutions effectively response to these demand, then these changes will stimulate a higher economic achievement. Both financial and economic developments therefore are positively interdependent and their relationships could lead to bidirectional causality (Choong *et al.*, 2003). Empirical support for this view can also be found, for examples, in the works of Greenwood and Smith (1997) and Luintel and Khan (1999).

Lastly, the fourth view is "the independent hypothesis". This view was originally put forward by Lucas (1988), who argued that financial and economic developments growth are not causally related or in the words of Lucas (1988), *"economic badly overstress the role of financial factors in economic growth"*. Meanwhile, Chandavarkar (1992) noted that *"none of the pioneers of the development economics.....even list finance as a factor of development"*.

From the above brief exposition of different streams of thought on the relationship between financial and economic developments, it is obvious that the literature on this issue is mixed and inconclusive. Accordingly, it is appropriate and timely to empirically re-examine the financial development and economic growth relationship in the Thai economy. Does the finance-growth nexus in this country supports the first view (the finance-led growth hypothesis or the supply-leading view), the second view (the growth-led finance hypothesis/the demand-following view), the third view (the feedback hypothesis/the bidirectional causality view), or the last view (the independent hypothesis)? To what extent the financial development is significant in promoting economic growth in Thailand? By adopting the ARDL bound testing approach, VECM, VDCs and IRFs, this study aims at probing this issue in the Thai economy during the post-1997 financial crisis period.

3. Data and Empirical Framework

This study is carried out in the context of the Thai country during the post-1997 financial crisis period on the quarterly basis from 1998-2006.[3] All the data employed in this study are obtained from the International Financial Statistic (IFS) report published by the International Monetary Fund (IMF). As for the financial development measurement, the study uses financial depth (FD), following the study of Christopoulos and Tsionas (2004). The finance depth (FD) is the ratio of total bank deposits liabilities to nominal GDP. The study also includes share of investment (SI) as ancillary variable. The share of investment (SI) is the share of gross fixed capital formation to nominal GDP. Meanwhile, the economic growth (GDP) is proxied by real Gross Domestic Product (GDP). Since price stability is believed to have a great impact on the Thai economy, thus the inflation rate is included in the study as another ancillary variable to avoid the simultaneity bias (Gujarati, 1995). In this study, inflation (INF) is measured by the changes in Consumer Price Index (CPI).

3.1 Autoregressive Distributed Lag (ARDL) 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 *et al*. (1996). The ARDL has numerous advantages. Firstly, unlike the most widely method used for testing cointegration, the ARDL approach can be applied regardless of the stationary properties of the variables in the samples and allows for inferences on long-run estimates, which is not possible under the alternative cointegration procedures. In other words, this procedure can be applied irrespective of whether the series are $I(0)$, $I(1)$, or fractionally integrated (Pesaran and Pesaran 1997; and Bahmani-

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

Oskooee and Ng, 2002), thus avoids problems resulting from non-stationary time series data (Laurenceson and Chai, 2003). Secondly, the ARDL model takes sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework (Laurenceson and Chai, 2003). It estimates $(p+1)^k$ number of regressions in order to obtain optimal lag-length for each variable, where p is the maximum lag to be used, k is the number of variables in the equation. Finally, the ARDL approach provides robust results for a smaller sample size of cointegration analysis. Since the sample size of our study is 36, this provides more motivation for the study to adopt this model.

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

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

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, and e_t is an error term.

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

$$\Delta GDP_t = \delta_0 + \sum_{i=1}^{p} \varepsilon_i \Delta GDP_{t-i} + \sum_{i=0}^{p} \phi_i \Delta FD_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta SI_{t-i} + \sum \gamma_i \Delta INF_{t-i} + \lambda_1 \mathrm{GDP}_{t-1} + \lambda_2 \mathrm{FD}_{t-1} + \lambda_3 \mathrm{SI}_{t-1} + \lambda_4 \mathrm{INF}_{t-1} + \mathrm{u}_{1t} \quad (2)$$

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

assumes that they are all $I(0)$. This provides a bound covering all possible classifications of the variables into $I(1)$ and $I(0)$ or even fractionally integrated. If the F-statistic lies exceeds upper bound level, the null hypothesis is rejected, which indicates the existence of cointegration. On the other hand, if the F-statistic falls below the bound level, the null hypothesis cannot be rejected, which supporting no cointegration exist. If, however, it falls within the band, the result is inconclusive.

Finally, in order 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 numbers of observations, the possible optimal lag-length to be considered is only 4.

3.2 Vector Error Correction Model (VECM) Framework

To examine the multivariate causality relationship among the variables, the study employs the vector error correction model (VECM) framework. The VECM regresses the changes in the both dependent and independent variables on lagged deviations. The multivariate causality test based on VECM can therefore be formulated as follows:

$$\Delta Z_t = \delta + \Gamma_i \Delta Z_{t-1} + ...+ \Gamma_k \Delta Z_{t-k} + \Pi Z_{t-k} + \varepsilon_t \quad (3)$$

where Z_t is an $n \times 1$ vector of variables and δ is an $n \times 1$ vector of constant, respectively. 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) represents the speed of short run adjustment to disequilibrium and β' is an $1 \times n$ cointegrating row vector (the matrix of cointegrating vectors) 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 both the independent and dependent variables have a stable relationship in the long-run.

From the Equations (3), two channels of causation may be observed. The first channel is the standard Granger tests, examining the joint significance of the coefficients of the lagged independent variables. Whereas, the second channel of causation 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 and at the same time; it tells us that the dependent variable adjusts towards its long run level. From these tests, we can reveal four patterns of causal interactions among pairs of the variables, i.e., (i) a unidirectional causality from a variable, say x, to another variable, say y; (ii) a unidirectional causality from y to x; (iii) bidirectional causality; and (iv) independent causality between x and y.

3.3 Variance Decompositions (VDCs) and Impulse-Response Functions (IRFs)

Apart from the above battery of time series techniques, the study also generates variance decompositions (VDCs) and impulse-response functions (IRFs) to further delve into the dynamics interaction among the variables. The VDCs enable us to examine the out-of sample causality among the variables in the VAR system. It measures the percentage of the forecast error of variable that is explained by another variable. Precisely, it indicates the relative impact that one

variable has on another variable. At the same time, it provides information on how a variable of interest responds to shocks or innovations in other variables. Thus, 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 VDCs findings, the Sim's (1980) innovation accounting procedure is employed. This procedure 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, the IRFs (also known as innovation accounting in the literature) allow us to trace temporal responses of variables to its own shocks and shocks in other variables. In our context, from the IRFs we can assess the direction, magnitude and persistent of economic growth responses to innovations in the financial development and inflation.

4. Empirical Results

Before estimating the short- and long-run relationships between financial development, inflation and economic growth for the Thai economy, we have to decide about 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 the 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 is reported in Table 1 along with the critical values at the bottom of the table. As reported, the test outcome of the significance levels varies with the choice of lag-length. With the exception of the lag-length = 4, all other lag-lengths = 1, 2 and 3 are found to be significant at least at 95% level. The results seem to provide evidence for existence of a long-run relationship between economic growth, financial depth, inflation and share of investment in Thailand. In other words, these variables are found to have a long-run equilibrium in which the variable has a tendency to move together in the long-run. This

Table 1 F-statistics for Testing the Existence of a Long-run Growth Equation

Lag-Length	F-Statistics
1	3.4099**
2	5.7778***
3	7.9124***
4	1.6687

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

Table 2 The Long Run ARDL Model Estimates

	ARDL [2,2,0,0]
C	1.6952*** (14.3626)
FD	.00839* (1.7916)
SI	.61476*** (3.5825)
INF	.039192** (2.10802)
	Adj-R^2 = .96250 D-W = 2.4762

Note: *, ** and *** denotes significantly at 10%, 5% and 1% level of 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.

results should be considered preliminary and indicate that in estimating Equation (1) we must retain the lagged level of variables.

In the second stage, we retain the lagged level of variables and estimates 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, 2, 0, 0], the Thai economic growth is found to be to be positively affected by the financial development and price stability.

Our finding of the positive finance-growth relationship is compatible with many earlier studies such as by Christopoulos and Tsionas (2004) for Thailand during period 1970-2000, Habibullah and Eng (2006), Choong *et al*. (2003) and Vaithilingam *et al*. (2005) for Malaysia during different periods, spanning from 1976 to 2000. Furthermore, the relatively lower rate of inflation in Thailand during the study period as compared to some other ASEAN-4 economies has intensified the economic growth.[4] Earlier empirical studies documented that for countries with low inflation rate below 10 percent annually, their economic growth will be accelerated (Bekaert *et al*., 2005; and Hung, 2003), while countries with high inflation about 10-20 percent a year could detriment the long-run economic growth (Gylfason *et al*., 2001; and Andrés *et al*., 2004). This particular finding implies that in order to promote growth in Thailand, the Bank of Thailand (BOT) should continue its inflation targeting policy which has been adopted since 2000. Inflation targeting is the best tool to ensure high output, sustainable growth, export competitiveness, prevention of a worsening of income distribution and a transparent and accountable central bank.

---

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

Our findings on the finance-growth nexus seem to indicate that in the aftermath of the 1997 financial crisis, the Thai authority has successfully enhanced their financial sector and controlled price stability in speeding up the economic growth of the country. This indicates that maintaining and even enhancing the current practices of banking sector and stock market should be given priority by the Thai policy makers in order to further promote their economic growth.

After exploring the long run association between economic growth, inflation and measures of financial development, we now proceed to multivariate Granger causality test based on VECM. At this juncture, it is important to note that the documented cointegration among 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 among the economic growth (GDP), financial depth (FD), share of investment (SI) and inflation (INF).

Table 3 Multivariate 'VECM' Causality

Dependent Variables	Independent Variables				
	ΔGDP	**ΔFD**	**ΔSI**	**ΔINF**	**ECT_{t-1}**
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%, 5% and 10% levels, respectively. ECT_{t-1} is derived by normalizing the cointegrating vectors on the GDP as proxy for economic growth, producing 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.

It is interesting to note that both error correction terms (ECTs) and short run channels of Granger causality were temporarily active for our main model (i.e., when GDP is considered as dependent variable). The significance of ECTs at least for our main model, confirms the existence of long-run relationship among the variables as documented in earlier ARDL model, i.e., ARDL [2, 2, 0, 0]. Specifically, this implies that any deviations from the long-run equilibrium relationships in the Thai economy 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.

At this jucture, we also note that there is only one short run interaction exist between the variables, i.e., a bidirectional causality between GDP and FD. This particular finding supports "the feedback hypothesis" or "the bidirectional causality view". According to this view, the Thai financial system has been able to promote high economic expansion through technological changes, product and services innovation. This in turn, will create high demand on the financial arrangements and services. As the financial institutions effectively response to these demand, then these changes will stimulate a higher economic achievement. Both financial and economic developments therefore are positively interdependent and their relationships could lead to bidirectional causality.

Table 4 Variance Decompositions

Horizon (Quarterly)	Explained by shocks in:			
	GDP	FD	SI	INF
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

To further explore dynamic interaction between financial development and economic growth, the study proceed to test the

variance decompositions (VDCs) and impulse-response functions (IRFs). The results of VDCs reported in Table 4 provide detailed information on the relative strength of the financial depth, share of investment and inflation in explaining the changes in the economic growth. From the VDCs and IRFs results, we are also able to capture he relative important of various shocks and their influences on the economic growth. The VDCs and IRFs are simulated by orthogonalizing the innovations in the vector autoregression (VAR) equations using the so-called Cholesky decomposition suggested by Sim (1980) with the orderings of the variables: GDP, FD, SI, INF.[5] Based on VDCs results for the horizon of 1-12 quarters, we find that the variations in the economic growth in Thailand respond more to shocks in the share of investment account for about 0-8 percent of economic growth forecast error variance after 3 years. The variations in the economic growth in the country, however, rely more on its own innovations. This finding seems to support our earlier finding of short-run dynamic causalities among the variables examined in the study.

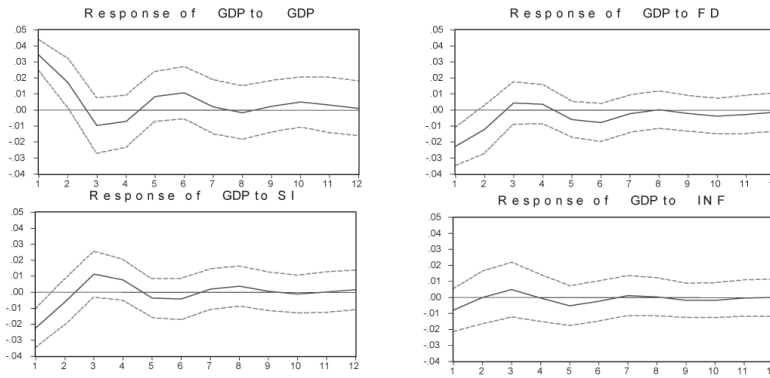

Figure 1 Generalized Impulse-Responses Functions

[5] We also have tried to use different orderings of the variables such as GDP, FD, INF, SI; GDP, INF, SI, FD; and GDP, INF, FD, SI. We also have 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.

To complement our analysis on the VDCs, we further generate the IRFs, as described above. As reported in Figure 1, the overall results seem to be very much consistent with our earlier findings. Economic growth seems to have immediate response to shocks in the financial depth and share of investment. This further implies that any policies pertaining to the price stability, investment and financial development should at least be noted by the government 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% significance level. This implies that all coefficients in the error correction model are stable over the time. The selected model adopted in the study seems to be good enough and robust in estimating the short- and long-run relationships between financial development and economic growth.

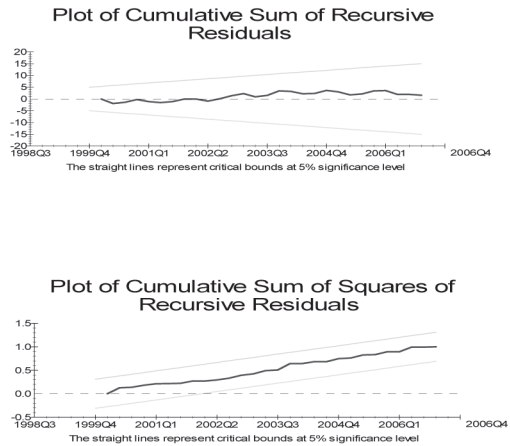

Figure 2 CUSUM and CUSUMSQ Plots

5. Conclusion and Some Policy Implications

By employing a battery of statistical tests, this paper empirically explore the short- and long-run relationships between financial development and economic growth in Thailand during the post-1997 financial crisis. It also attempts to empirically investigate the dynamic causality among the variables using vector error correction model (VECM) and re-examine the model in level form and generates variance decompositions (VDCs) and impulse-response functions (IRFs) to further assess their interactions such that robust conclusion can be made. Based on the specified ARDL models, the paper finds a long-run equilibrium between economic growth, finance depth, inflation and share of investment. The study also documents that the common sources of economic progress/regress in Thailand is price stability and financial development. Specifically, this implies that in promoting the growth of economy, it is very important for the government to preserve price stability by maintaining a lower rate of inflation and enhancing the financial sectors both banking and stock market.

In terms of the dynamic causalities among the variables, the study documents the bidirectional causality between financial development and economic growth. This finding is in harmony with "the feedback hypothesis" or "the bidirectional causality view". This proves that the Thai financial system has been able to promote high economic expansion through technological changes, product and services innovation. This in turn, will create high demand on the financial arrangements and services. As the financial institutions effectively response to these demand, then these changes will stimulate a higher economic achievement. Both financial and economic developments therefore are positively interdependent and their relationships could lead to bidirectional causality.

Based on VDCs and IRFs tests, we find that the variations in the economic growth respond more to shocks in investment. It only accounts for about 0-8 percent of economic growth forecast error variance after 12-quarter. Economic growth seems to have immediate

response to shocks in the financial depth and share of investment. This further implies that any policies pertaining to the price stability, financial development and investment should at least be noted by the government in order to speed up her economic growth.

The most important implication of our findings is a policy recommendation: if policy makers want to promote growth, then attention should be focused on long run policies, for example the enhancement of the existing modern financial institutions both in the banking sector and stock market. The government, therefore, needs to further enhance the banking sector and provide a conducive environment for investors to diversify investments into the stock market. The enhancement of financial sector, banking and stock market is an important factor to be looked into in order to speed up the economic growth.

Finally, to enhance and enrich the findings of present study, more robust analysis is needed. Further researches that are recommended in this context are in terms of comparing the analyses between the pre- and post-1997 financial turmoil periods; perhaps this could provide a clearer picture for the policy implementation. Additionally, the enrichment of the finding could also be done by including more countries into the analysis such as by examining all ASEAN countries. A comparative study between the emerging economies such as Thailand with the developed markets would also provide additional insight into the existing empirical evidence.

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. Hernando, I., and López-Salido, J.D. (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 Bohl, M.T. (2000). German monetary unification and the stability of the German M3 money demand

function. *Economics Letters,* 66: 203-208.

Bahmani-Oskooee, M., and Ng, R.C.W. (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., Harvey, C.R., and Lundblad, C. (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., Yusop, Z., Law, S. H., and Sen. V.L.K. (2003). Financial development and economic growth in Malaysia: the stock market perspective. *Economic Working Paper* Archive at WUSTL – Macroeconomics.

Christopoulos, D.K., and Tsionas, E.G. (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 Hussein, A.K. (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 Schwartz, A.J. (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 Smith, B. (1997). Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics and Control,* 21: 145-181.

Greenwood, J., and Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy,* 98(5): 1076-l108.

Gujarati, D. (1995). *Basic Econometrics*. New York: McGraw-Hill.

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

Habibullah, M.Z., and Eng, Y.K. (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. (2006). *International Financial Statistic Online: www.imfstatistics.org*.

Khan, S.M. and Senhadji, A.S. (2000). Financial and economic growth: an overview. *IMF Working Paper.* International Monetary Fund, Washington.

Laurenceson, J and Chai, J.C.H. (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 Khan, M. (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, DC: 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, DC, 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 Pesaran, B. (1997). *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford, Oxford University Press.

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

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

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*. Oxford Univ. Press, NY.

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*. 7th Edition. United Kingdom: Addison Wesley Longman.

Vaithilingam, S, Nair, M., and Guru, B. (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.