Determining the relationship between financial development and economic growth: An application of ARDL technique to Singapore

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Abstract

The relationship between financial development and economic growth has been subject to considerable debate in the literature of development and growth. While empirical studies often provide a direct relationship between financial development proxies and growth, much controversy remains about how these results should be interpreted. The study, therefore, attempts to unravel the causality direction of financial development and economic growth. We used an Autoregressive Distributed Lag (ARDL) method to assess the finance-growth relation taking Gross National Expenditure, Gross Fixed Capital Formation, exports, Foreign Direct Investments and Loans made to the Private Sector as financial development indicators for Singapore over the period from 1970 to 2013. Interestingly, we found that our financial development variables had no impact on economic growth.

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2.0 Introduction

2015 marks the 50th anniversary of Singapore's independence. With a highly developed and successful free-market economy, it currently enjoys an open and corruption-free environment, stable prices, and a per capita GDP higher than that of most developed countries. The economy depends heavily on exports, particularly in consumer electronics, information technology products, pharmaceuticals, and on a growing financial services sector. It is worth noting that more than two decades have passed since Singapore launched significant moves to develop as a financial center. The presence of institutions of international repute, the introduction of new financial instruments, the availability of expertise and the wide range and large volume of financial activities transacted in the Republic speak volumes of its status as a financial centre. Before the 1970s the financial sector merely fulfilled a subsidiary role andby the mid-1970s,Singapore had largely liberalized its financial system. The potential for the financial sector to become a growth sector, serving the needs of not only the domestic economy but also the regional and international economy, was recognized in the late 1960s. Cautious financial policies were then undertaken to improve investor confidence internally and externally, which has not only led to an increased monetization but also greater capital deepening of the economy. These efforts contributed to the rapid growth of the financial sector, which became the second largest contributor to both GDP (gross domestic product) and employment in the economy after manufacturing.

The link between financial development and economic growth has attracted much attention in economics discussion. The study of the "finance–growth" nexus has been an issue of concern since finance is said to be a major contributor of the economy. While most economists contend that financial intermediaries mobilise, pool and channel domestic savings into productive

capital and by doing so contribute to economic growth, others argue that financial development is a direct consequence of economic growth, as economic growth increases demand for sophisticated financial instruments which consequently leads to growth in the financial sector.

So far availableempirical and theoretical evidence have been mixed as to whether financial development contributes to economic growth or economic growth leads financial development. The causal relationship of finance-growth nexus has important policy implications for the economy. If in the economy, financial development causes economic growth, reformation, creation and promotion of modern financial institutions become necessary and important for piloting economic growth. The consolidation of banks and non-bank financial institution like stock market and insurance companies becomes necessary and predictive conditions for the growth of the economy. If on the other hand, causation runs from economic growth to financial development, policy effects to reform and promote financial development would be a waste of scarce resources.

The purpose of this paper therefore is to analyse the theoretical argument on the finance growth nexus and to determine whether financial development causes economic growth or vice versa. We will focus on Singapore's economy from 1970 to 2013, coinciding with the start of financial liberalisation in the city-state. Wewill utilise the autoregressive distributed lag (ARDL) model, in order to examine both potential longand short-term effects. Finally, as a direct result of our findings, we will analyse policy implications for Singapore.

3.0 Literature Review

Generally, the literature has documented four views on the finance-growth nexus namely: supply leading, demand following, mutual impact of finance and growth and those that suggest that the role of finance in promoting economic growth is overemphasized.

Among the initial influential contributions in this area is the work of Patrick (1966) as he developed the ideas of 'demand-following' and 'supply-leading' aspects of financial development. He hypothesised that demand for financial services was dependent upon the growth of real output and the commercialisation and modernisation of agriculture and other subsistence sectors. This demand-following hypothesis posits a unidirectional causation from economic growth to financial development. This implies that the increasing demand for financial services might lead to the aggressive expansion of the financial system as the real sector of the economy grows. Patrick (1966) also hypothesised that the supply-leading role of financial institutions was to act as productive inputs in the production process and to transfer resources from traditional to modern sectors. The supply-leading finance will cause economic development through the transfer of scarce resources from savers to investors according to the highest rates of return on investment.

One of the earliest known proponents of the notion that finance could be an engine of growth were Schumpeter and Opie (1934) who highlighted the role of financial institutions in funding productive investments and encouraging innovation, both of which foster growth. This sentiment was echoed by Gurley and Shaw (1955) and Goldsmith (1969), who argued that more developed financial markets promote economic growth by mobilizing savings to finance the most productive investments. The "supply-leading" hypothesis to mention a few, has been subsequently advanced and supported by many famous economists like McKinnon (1973), Shaw (1973), Fry (1978), Calderon and Liu (2002), King and Levine (1993).Recent empirical work by Gelb (1989), Ghani (1992), King and Levine (1993), DeGregorio and Giudotti (1995), and Levine and Zervos (1996) have also lent support to the supply leading hypothesis through data obtained from many developing and developed countries. Their empirical results revealed positive and statistically significant coefficients on the proxies of financial deepening in the real economic growth equations. In a more recent study, Xu (2000) finds strong evidence that financial development, primarily via the investment channel, affects growth positively.

Robinson (1952) argues that economic growth drives the demand for financial services rather than the other way round. Financial development follows economic growth as a result of higher demand for financial services. As such, an increasing demand for financial services might induce an expansion in the financial sector as the real economy grows (therefore, a positive response for the financial sector to economic growth). Odhiambho (2004) investigated the finance-growth nexus in South Africa using cointegration approach and vector error correction model on monetization ratio namely the ratio of M2 to GDP and intermediation ratio, the ratio of bank claims on the private sector to GDP against economic growth proxied by real GDP per capita. His results revealed demand-following response between financial development and economic growth and totally discredited the supply-leading hypothesis.

Yet, there were still some studies that proved to be inconclusive. Arestis and Demetriades (1997) used Johansen cointegration on time series analysis for the United States and Germany and found insufficient evidence to claim that financial development spurs economic growth. Their data rather pointed to the direction that real GDP contributes to both banking system and stock market development.

Lucas (1988) discounts altogether the possibility that the financial sector has any impact on growth. In Nigeria, Agu and Chukwu (2008) found that the Nigerian evidence supported the demand – following hypothesis for bank-based financial deepening variables like private sector credit and broad money. However, it supported the supply – leading hypothesis for "bank-based" financial deepening variables like loan deposit ratio and bank deposit liabilities.

The importance of financial development has received renewed attention as the endogenous growth literature evolved since the 1980s (see Bencivenga& Smith, 1991). The strength of the finance–growth relationship is ultimately an empirical matter (Levine, 2005), and much of the subsequent literature has focused on the multi-faceted empirical aspects of this relationship. The emergence of endogenous growth theory (Lucas, 1988) generated renewed interest in the role of financial development in driving economic growth. The theoretical work of Greenwood and Jovanovic (1990)

shows that financial intermediaries promote investment and growth by enabling a higher rate of return on capital, while the growth itself spurs the expansion of financial institutions, implying a two-way relationship between financial intermediation and economic growth.

Earlier research was based on cross-sectional data using standard OLS estimation methods, which confirmed the positive correlation between financial development and economic growth (see, for instance, Goldsmith, 1969; Levine &Zervos, 1998). While their findings suggest that finance helps to predict long-term growth, a number of authors (Barro, 1991; Chuah& Thai, 2004; Khan &Senhadji, 2003) argue that conclusions based on cross-sectional analysis are unreliable and have several econometric problems. First, the results are sensitive to the sample of countries chosen: it may be inappropriate to draw policy implications from cross-country studies that treat different economies as homogeneous entities. Second, they do not take advantage of time-series variation in the data. Finally, the issue of causality cannot be handled formally in cross-sectional studies (Khan &Senhadji, 2003).

4.0 Objective of the Study

Given the crucial importance of the direction of causality between financial development and economic growth in formulating development plans, we want to address this issue through the application of the autoregressive distributed lag (ARDL) model, in order to examine both potential longand short-term effects. We have taken Singapore as a case study, acquiring data from 1970 to 2013. This study will depart slightly from earlier works and represent our attempts at advancing the field in the following ways: (i) as far as we are aware of, this study will investigate the issue of causal direction between financial development and economic growth in the context of Singapore by utilising ARDL techniques with more recent data; up to 2013; previously, Leigh (1996) utilised Singapore data only up till the 1990s (ii) we believe that the application of the recently developed time-series techniques, such as, the vector error correction and generalized variance decompositions

on this issue will also be the first attempt for Singapore and (iii) the findings of the study on the direction of causality will have distinct policy implications for Singapore for her continued growth and development.

5.0 Theoretical Underpinnings

Although the focus of this article is on the lead-lag relationship between financial development and economic growth, these two variables interact through some other 'control' variables. The theoretical literature is not very clear about the transmission channel between 'finance' and 'growth' but it is generally postulated that 'finance' affects 'growth' through investments. We try to proxy the investment channel by gross fixed capital formation (GFCF), Foreign Direct Investments (FRI) as well as Gross National Expenditure (GNE) and finally, for an open economy highly dependent on exports, foreign trade is likely to be an important channel through which the financial development affects economic growth. So we bring in another conditioning variable represented by the amount of exports (X). In order to ensure that the size of the financial intermediaries is linked with the provision and quality of financial services, the financial development is proxied by loans given to the private sector (PTECR). Finally, economic growth is usually represented by the GDP per capita (GDP). Based on the above mentioned theoretical underpinnings, the lead-lag relationship between economic growth and financial development has been tested on the following variables: an economic growth variable (such as GDP per capita), a financial development variable (such as credit to the private sector) and some 'control' variables (such as exports and FDI for an open economy). We expect the economic growth variable and the financial variables to be positively related. The causality will be tested mainly through the error correction model. All data has been sourced from *Datastream* via a dedicated terminal.

6.0 Methodology

We estimated our model using the Autoregressive Distributed Lag (ARDL) cointegration procedure proposed by Pesaran et al (2001) to overcome the limits related to the method suggested by Engle and Granger (1987) and Johansen (1991). The ARDL procedure classifies variables as either dependent or explanatory. One of the reasons for preferring the ARDL is its applicability irrespective of whether the underlying regressors are purely or mutually cointegrated. We then avoid the potential bias associated with unit roots and cointegration tests. The statistic underlying this procedure is the familiar Wald or F-statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium error correction model (ECM) (Pesaran, et al. 2001, pp. 289-290). In addition, endogeneity problems are addressed in this technique. According to Pesaran and Shin (1999), modelling the ARDL with the appropriate lags will correct for both serial correlation and endogeneity problems. Jalil et al (2008) argue that endogeneity is less of a problem if the estimated ARDL model is free of serial correlation. In this approach, all the variables are assumed to be endogenous and the long run and short run parameters of the model are estimated simultaneously (Khan et al, 2005). The issue of endogeneity is particularly relevant since the causal relationship between financial development and economic growth cannot be ascertained beforehand. The literature suggests that a bidirectional relationship could exist between financial development and economic growth. Another reason for using the ARDL approach is that it is more robust and performs better for small sample sizes (in this study, annual data was used and therefore restricted) than other cointegration techniques.

The ARDL approach involves estimating the conditional error correction version of the ARDL model for variables under estimation. The existence of an error-correction term among a number of cointegrated variables implies that changes in the dependent variable are a function of both the level of disequilibrium in the cointegration relationship (represented by the ECM) and the changes in other explanatory variables. This tells us that any deviation from the long-run equilibrium will feed back on the changes in the dependent

variable in order to force the movement towards the long-run equilibrium (Masih and Masih, 2002). The ARDL approach involves two steps for estimating the long-run relationship (Pesaran et al., 2001). The first step is to examine the existence of long–run relationship among all variables in the equations under estimation. The second step is to estimate the long-run and the short-run coefficients of the same equation. We run the second step only if we find a long-run relationship in the first step (Narayan, 2004). This study uses a more general formula of ECM with unrestricted intercept and unrestricted trends (Pesaran et al., 2001, p. 296): The asymptotic distributions of the F-statistics are non-standard under the null hypothesis of no cointegration relationship between the examined variables, irrespective of whether the variables are purely or mutually cointegrated. Two sets of asymptotic critical values are provided by Pesaran (1997). If the computed F-statistics is greater than the upper bound critical value, then we reject the null hypothesis of no cointegration and conclude that there exists steady state equilibrium between the variables. If the computed F-statistics is less than the lower bound critical value, then we cannot reject the null of no cointegration. If the computed F-statistics falls within the lower and upper bound critical values, then the result is inconclusive; in this case, following Kremers et al (1992), the error correction term will be a useful way to establishcointegration. The second step is to estimate the long-run coefficient of the same equation and the associated ARDL error coercion models. The ARDL model requires a priori knowledge or estimation of the orders of the extended ARDL. This appropriate modification of the orders of the ARDL model is sufficient to simultaneously correct for residual serial correlation and the problem of endogenous regressors (Pesaran and Shin, 1998, p. 386). The order of the distributed lag on the dependent variable and the regressors is selected using either the Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC). This study will use AIC as a lag selection criterion. Based on the previous discussion, a significant F-statistic for testing the joint level significance of the lagged level indicates the existence of long-run relationship.

The relationship between economic growth and financial development can be specified as:

$$LGDP_t = \alpha_0 + \alpha_1 LGNE_t + \alpha_2 LX_t + \alpha_3 LGFCF_t + \alpha_4 LPTECR_t + \alpha_5 LFRI_t + \varepsilon_t$$

Where:

GDP is GDP per capita, expressed as a natural logarithm

LGNE is Gross National Expenditure, expressed as a natural logarithm

LGFCF is Gross Fixed Capital Formation, expressed as a natural logarithm

LPTECR is Loans to Private Sector, expressed as a natural logarithm

LFRI is Foreign Direct Investment, expressed as a natural logarithm

Next, an ARDL representation of the first equation can be specified as:

$$\Delta LGDP_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LGDP_{t-1} + \sum_{i=1}^{p} \beta_2 \Delta LGNE_{t-1} + \sum_{i=1}^{p} \beta_3 \Delta LX_{t-1} + \sum_{i=1}^{p} \beta_4 \Delta LGFCF_{t-1} + \sum_{i=1}^{p} \beta_5 \Delta LPTECR_{t-1} + \sum_{i=1}^{p} \beta_6 \Delta LFRI_{t-1} + \delta_1 LGDP_{t-1} + \delta_2 LGNE_{t-1} + \delta_3 LX_{t-1} + \delta_4 LGFCF_{t-1} + \delta_5 LPTECR_{t-1} + \delta_6 LFRI_{t-1} + \nu_t$$

Where:

***Δ** is difference operator*

p is the lag length

$\nu_t$is assumed to be serially uncorrelated

Lastly, the error correction representation of the series can be specified as follows:

$$\Delta LGDP_t = \beta_0 + \sum_{i=0}^{p} \beta_1 \Delta LGDP_{t-1} + \sum_{i=0}^{p} \beta_2 \Delta LGNE_{t-1} + \sum_{i=0}^{p} \beta_3 \Delta LX_{t-1} + \sum_{i=0}^{p} \beta_4 \Delta LGFCF_{t-1} + \sum_{i=0}^{p} \beta_5 \Delta LPTECR_{t-1} + \sum_{i=0}^{p} \beta_6 \Delta LFRI_{t-1} + \xi ECM_{t-1} + \mu_t$$

Where:

ξ is the speed of adjustment parameter

ECM is the residuals obtained from equation 1 (i.e. the error correction term).

The coefficient of the lagged error correction term (ξ) is expected to be negative and statistically significant to further confirm the existence of a cointegrating relationship.

7.0 Data, Empirical Results and Discussions

7.1 Unit root Test

Even though the bounds test for cointegration does not require pre-testing of the variables for unit root, it is imperative that this test is conducted to ensure that the series are not integrated of an order higher than one. This approach is necessary to avoid the problem of spurious results. We have employed the Augmented Dickey-Fuller (ADF), Phillip Peron and KPSS tests to determine Stationarity. The Schwartz-Bayesian Criterion (SBC) and AkaikeInformation Criterion (AIC) are used to determine the optimal number of lags included in the test. The results of the ADF test are reported in table 1. The results suggest that all the variables are integrated of order one i.e. stationary after first difference except FRI, which is stationary in level. GFCF was also found to be Non-Stationary in differenced form. This result gives support to the use of ARDL bounds approach to determine the long-run relationships among the variables.

Variable	Lag	ADF test	PP Test	KPSS Test
LGDP	1	Non Stationary	Non Stationary	Non Stationary
LGNE	1	Non Stationary	Non Stationary	Non Stationary
LX	1	Non Stationary	Non Stationary	Non Stationary
LGFCF	1	Non Stationary	Non Stationary	Non Stationary
LPTECR	3	Non Stationary	Non Stationary	Non Stationary
LFRI	5	Stationary	Stationary	Non Stationary
dGDP	1	Stationary	Stationary	Stationary
dGNE	1	Stationary	Stationary	Stationary
dX	1	Stationary	Stationary	Stationary
dGFCF	4	Stationary	Stationary	Non Stationary
dPTECR	1	Stationary	Stationary	Stationary
dFRI	2	Stationary	Stationary	Stationary

Table 1: Unit Root Test

7.2 Cointegration Analysis

Given a relatively small sample size (39) and the use of annual data, a lag length of 4 is used in the bounds test. AlthoughPesaran and Shin (1999) actually suggest a maximum of 2 lags, we have proceeded with 4 instead. The results of the bound test are given in table 2. The critical values used in this paper are extracted from Narayan (2004).

Test Statistic	Value	Lag	Significance Level	Bound Critical values (restricted intercept and no trend)*	
				I (0)	I(1)
F-Statistic	3.3798	4	1%	3.668	4.978
			5%	2.945	4.088
			10%	2.578	3.646
	$F_{GNE}(.)$= 4.2859, $F_{X}(.)$= 3.0181, $F_{GFCF}(.)$= 3.7764, $F_{PTECR}(.)$= 2.0536, $F_{FRI}(.)$=3.684				

Table 2: Bounds Test Results

The F-statistic for the model is 3.3798, which is inconclusive for both the 5 and 10 percent significance level. This suggests that there may or may not be a long-run relationship among GDP, GNE, exports, GFCF, Loans to Private Sector and Foreign Direct Investments. When Loans to Private Sector is taken as a dependent variable, there is no evidence of the existence of a cointegrating relationship as the calculated F-statistic (2.0536) falls below the lower critical bound (2.578 at the 10 percent significance level). However, we did found that there were long run relationships when GNE (4.2859; 5% significance), GFCF (3.7764; 10% significance), FRI (3.684; 10% significance) were set as the dependent variables.

7.3 Static Long-Run Results

The estimation of the ARDL model is based on the Akaike Information Criterion (AIC). The static long-run results and the diagnostic test statistics of the estimated model based on short run estimates are reported in table 3. GNE, exports, GFCF and FRI have the expected positive signs and exert statistically significant effects on GDP. All the variables are statistically significant but Loans to Private Sector has a negative sign. A 1% increase in exports has a 0.13% corresponding increase in GDP while the same increase in GFCF affects GDP by 0.27%. On the other hand, a 1% increase in Foreign Direct Investments only results in a 0.029% increase in GDP. This could be due to the existence of already high levels of FDI in Singapore.

Lastly and most interestingly, a 1% increase in loans to the private sector will actually decrease the GDP by 0.19645%. This is an interesting point but one which has been found by a previous study. Ahmed (2008) found negative but significant relationship for Sierra Leone when private sector credit was used, and the relationship was positive but insignificant when domestic credit was employed. The findings by Esso (2009) also showed negative impact of financial development on real GDP per capita in the long run.

Variable	Coefficient	Standard Error	T-Ratio
	0.19668	0.068239	2.8822***

LGNE			
LX	0.13472	0.060055	2.2433**
LGFCF	0.27814	0.057497	4.8375***
LPTECR	-0.19645	0.073633	-2.6680**
LFRI	0.029564	0.012004	2.4629**
INPT	-2.3452	0.91444	-2.5646**

Diagnostics Tests

Test Statistics	M-Version	F-Version
A: Serial Correlation	CHSQ(1) = .013231[.908]	F(1,32) = .0098491[.922]
B: Functional Form	CHSQ(1) = 3.7796[.052]	F(1,32) = 3.0838[.089]
C: Normality	CHSQ(2) = 1.1893[.552]	Not applicable
D: Heteroscedasticity	CHSQ(1) = .59139[.442]	F(1,41) = .57175[.454]

Table 3: Long-run Estimates based on AIC- ARDL (1,0,1,1,1,0)

Dependent Variable is LGDP

*Note: ***,** imply significance at the 1 and 5 percent levels respectively.*

7.4 Short-Run Dynamics

The results of the short-run dynamics associated with the ARDL (1,0,1,1,1,0) are reported in table 4. The coefficient of the lagged error correction term (-0.13527) is negative and not statistically significant at all. The magnitude of the coefficient implies that 13 percent of the disequilibrium caused by previous year's shocks converges back to the long-run equilibrium in the current year. The results of short-run dynamic coefficients indicate that the variables have the same expected signs as in the long run. However, unlike in the long run, GNE was not found to be statistically significant because the effects of National Expenditure could not be felt in the short run. Otherwise, a 1% increase in exports and GFCF both have approximately a 0.19% corresponding increase in GDP. On the other hand, a 1% increase in Foreign Direct Investments only results in a 0.035% increase in GDP. This could be due to the existence of already high levels of FDI in Singapore. Similar to the long run results, a 1% increase in loans to the private sector will actually decrease the GDP by 0.2%. Since the interactive term for financial liberalization exerts a

negative and significant impact on economic growth, further financial sector reforms are needed to facilitate financial development for economic growth.

Variable	Coefficient	Standard Error	T-Ratio
dLGNE	0.085675	0.066952	1.2797
dLX	0.19115	0.062118	3.0771***
dLGFCF	0.19327	0.056855	3.3994***
dLPTECR	-0.20147	0.077185	2.6102**
dLFRI	0.035872	0.012802	2.8020***
Ecm(-1)	-.013527	.088725	-1.5246

ecm = LGDP -0.63335(LGNE) + 0.099939(LX) -0.21399(LGFCF) + 0.36744(LPTECR) - 0.26518(LFRI) + 7.0903(INPT)

R-Squared	0.86149	R-Bar-Squared	0.82371
S.E. of Regression	0.026770	F-Stat. F(6,36)	34.2077[.000]
Mean of Dependent Variable	0.074271	S.D. of Dependent Variable	0.063758
Residual Sum of Squares	0.023649	Equation Log-likelihood	100.3568
Akaike Info. Criterion	90.3568	Schwarz Bayesian Criterion	81.5508
DW-statistic	1.9193		

Table 4: Short Run Dynamic Results

8.0 Conclusion and Policy Implications

Recent cointegration techniques, which focus on the estimation and the identification of long-run economic relationships between data variables are particularly appropriate to the study of long-run endogenous growth models. This paper re-investigates the empirical relationship between financial development and economic growth in Singapore during the period 1970–2013. Our objective was to test the long run relationship between economic growth reflected by GDP per capita and financial development indicators.

Our study has thus empirically shown that the relationship between GDP and financial growth is inconclusive. This is similar to Arestis and

Demetriades (1997) who used Johansen cointegration on time series analysis for the United States and Germany and found insufficient evidence to claim that financial development spurs economic growth.

However, in the course of our analysis we did found that there were long run relationships with GDP when GNE, GFCF, FRI were set as the dependent variables. Thus, this information could be used to directly influence the GDP in the long run. The results of short-run dynamic coefficients indicate that the variables have the same expected signs as in the long run. However, unlike in the long run, GNE was not found to be statistically significant because the effects of National Expenditure could not be felt in the short run.

Perhaps most interestingly, an increase in loans to the private sector will actually decrease the GDP. This is an interesting point but one which has been found by a previous study. Ahmed (2008) found negative but significant relationship for Sierra Leone when private sector credit was used, and the relationship was positive but insignificant when domestic credit was employed. The findings by Esso (2009) also showed negative impact of financial development on real GDP per capita in the long-run. This is something that we did not expect.

We also found that the coefficient of the lagged error correction term (-0.13527) is negative and not statistically significant. The magnitude of the coefficient implies that 13 percent of the disequilibrium caused by previous year's shocks converges back to the long-run equilibrium in the current year.

Singapore's growth since 1970 has been nothing short of spectacular. The financial system as it is today is much more sophisticated compared to what it was two decades ago. Improvement in the financial system has facilitated the flow of funds into the economy and widened the scope for various financing activities. The financial system is also relatively free of restrictions.

However, the journey to such achievement is not without obstacles. For instance, the Singapore policy-makers have been previously criticised for being too omnipresent, thereby inhibiting innovation. This will result in Singapore's financial industry losing its competitive edge because the government has

emphasised control rather than innovation; it has failed to keep pace with the worldwide trend toward deregulation (Duthie, 1986).

Nonetheless, Singapore has emerged as a regional financial centre; with substantial financial growth in Singapore in the past two decades. With the world gradually coming to terms with the issue of international standards for the regulation, taxation and the supervision of financial institutions, the Singapore authorities should not ignore these longer-term issues as they frame their policies in the short run. As one of the major financial centres in Asia, Singapore will have corresponding important responsibilities for contributing to the development of an appropriate set of standards for the world financial system.

References

Arestis, P. and Demettriades, P. (1997). Financial development and economic growth: assessing the evidence. Economic journal, 107, 783-799.

Barro, R. J. (1991). Economic growth in a cross section of countries. Quarterly Journal of Economics, 106, 407–443.

Calderon, C. and Liu, L. (2002). The direction of causality between financial development and economic growth. Working paper No. 184.

Chuah. H. L., & Thai, W. (2004). Financial development and economic growth: Evidence from causality tests for the GCC countries. IMF Working Paper. countries", Economic Development and Cultural Change, 14(1), 174-189.

Degregorio, J. and Giudotti, P.E. (1995). Financial policies, growth, and efficiency. World development, 433-448.

Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation and testing.Econometrica, 55, 251–276.

Ghani, E. (1992). How financial markets affect long-run growth: A Cross-country study. World Bank working paper, PPR working paper series No. 843 .

Gurley, J. G. and Shaw, E. S. (1955). Financial aspects of economic development", American Economic Review. 45, 515-538.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica, 59, 1551–1580.

Khan, M. A., Qayyum, A. and Saeed, A. S. (2005). Financial development and economic growth: the case of Pakistan. The Pakistan Development Review 44, 4(2), 819-837.

King, R.G. and Levine, R. (1993). Finance entrepreneurship and growth: theory and evidence" journal of monetary economic, 32(3), 513-542.

King, R.G. and Levine, R. (1993). Finance and growth: Schumpeter might be right. Quarterly journal of economics, 108(3), 717-737.

Kremers, J. J., Ericsson, N. R., &Dolado, J. J. (1992). The power of cointegration tests. Oxford bulletin of economics and statistics, 54(3), 325-348.

Levine, R. (2005). Finance and growth: Theory, mechanism and evidence. In P. Aghion, & S. N. Durlauf (Eds.), Handbookof economic growth (865–934). North-Holland: Elsevier.

Levine, R., &Zervos, S. (1996). Stock market development and long-run growth. The World Bank Economic Review, 10(2), 323-339.

Levine, R., &Zervos, S. (1998). Stock markets, banks, and economic growth.American economic review, 537-558.

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

Masih, A. M. M. & Masih, R., 2002. Propagative causal price transmission among international stock markets: evidence from the pre- and post globalization period, Global Finance Journal, 13(1), 63-91.

Odhiambo, N. M. (2004). Is financial development still a spur to economic growth? A causal evidence from South Africa. Savings and Development, 47-62.

Patrick, H.T. (1966). Financial development and economic growth in underdeveloped countries. Economic Development and Cultural Change, 14(1), 174-189.

Pesaran, H., Shin, Y. and Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326.