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Financial liberalization, financial sector development and growth: Evidence from Malaysia

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Abstract

The objective of this paper is to examine whether financial development leads to economic growth or vice versa in the small open economy of Malaysia. Using time series data from 1960 to 2001, we conduct cointegration and causality tests to assess the finance-growth link by taking the real interest rate and financial repression into account. The empirical evidence suggests that financial liberalization, through removing the repressionist policies, has a favorable effect in stimulating financial sector development. Financial depth and economic development are positively related; but contrary to the conventional findings, our results support Robinson's view that output growth leads to higher financial depth in the long-run.
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1. Introduction

Since the emergence of the new theories of endogenous economic growth, there has been a revival of interest in the potential role played by financial development in the process of economic development. An important question in the literature is whether the financial system influences

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growth, or vice versa, in the long-run. Although the positive role of finance on growth is already a stylized fact as verified by many empirical studies, how financial repression impacts on financial development and its implication on the finance-growth nexus have not been adequately addressed in the literature. In this paper, we show that the "one-size for all" argument derived from the results of cross-country studies does not apply to Malaysia. Our results support Robinson's (1952) view that 'where enterprise leads finance follows' but not the hypothesis that a bank-based financial system induces long-term growth in the real sector. We attempt to provide some reasoning for the absence of causality running from finance to growth based on the unique structural features and the historical settings of the Malaysian economy. In addition, we also compare the results of this study with the experiences of other countries, which suggest a systematic relationship between financial repression, financial development and economic growth for these countries. This pattern could potentially account for the missing causal link from finance to growth observed in certain countries and contribute to the understanding of our empirical results for Malaysia.

Empirical studies on the relationship between finance and growth have been dominated by cross-country studies until recently due to the lack of sufficient time series data for developing countries. These studies have consistently demonstrated that financial development is an important determinant of economic growth.[2] Given that finance may have a causal impact on growth, the use of a simultaneous framework, which treats both finance and growth as endogenous variables, seems more appropriate. Time series studies which adopt this framework provide mixed evidence on the causal relationship between financial development and economic growth.[3] This paper uses the concept of causality in the *predictive* rather than in the *deterministic* sense. As Diebold (2004) put forward, "X causes Y" is simply the abbreviated expression for "X contains useful information for predicting Y". Hence, the causality results are interpreted in the Granger-sense.[4]

The Asian financial crisis that hit several countries in 1997–98 has raised concerns among policy-makers and researchers on the reliability and stability of emerging financial systems. If the standard measures of financial development were informative about the depth and degree of sophistication of the financial systems, these measures for Malaysia were very high prior to the onset of the crisis. This raises concerns about whether these cross-country findings can be readily applied to every country. Financial development does not necessarily lead to higher growth. As Morck and Steiler (2005) argue, more developed financial systems seem closely tied to better corporate governance and more efficient allocation of resources. But these correlations are rudimentary, and many counterexamples have been observed in the histories.[5]

Malaysia is a very interesting case study for this subject for two reasons. First, Malaysia has a rich history of financial sector reforms.[6] A series of financial restructuring programs that aimed at improving the financial system had been launched since the 1970s. Immediately after the Asian financial crisis hit the country in 1997–98, a series of macroeconomic policy responses such as

[2] See, e.g., King and Levine (1993a), Levine and Zervos (1998), Rajan and Zingales (1998), Beck et al. (2000), Levine et al. (2000), Beck and Levine (2002, 2004), Rioja and Valev (2004), and McCaig and Stengos (2005), among others.

[3] See, e.g., Demetriades and Luintel (1996), Luintel and Khan (1999), Rousseau (1999), Xu (2000), Bell and Rousseau (2001), Rousseau (2003), and Thangavelu and Ang (2004), among others.

[4] As Demetriades and Andrianova (2004) explain, the existence of a sound financial system is a precondition for the economy to materialize new innovations and exploit its resources efficiently. In this way, finance is seen as a facilitator for growth, rather than as a deep determinant of growth. Hence, even if the causality results may not be informative about the true economic causality, the interpretation of the results in the predictive sense is in line with the argument presented here.

[5] See also Morck and Nakamura (1999), Morck et al. (2000) and Fohlin (2005).

[6] See Yusof et al. (1994) for a detailed description of the financial sector reforms history in Malaysia.

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capital controls and reflationary policy have taken place. This was followed by restructuring in the corporate and banking sectors. However, despite these changes in the financial environment, no study has to date been able to take a close look at and document the effect of these financial sector policies on the financial system, with particular reference to the Malaysian experience. This study is an attempt to fill the gap. Second, the database for Malaysia is considered relatively good by developing country standards. The use of annual data covering the period 1960–2001 is sufficiently long to allow for a meaningful time series investigation, which addresses the concerns raised about the lack of time series-based individual country studies (Athukorala and Sen, 2002, p. 2).

This paper is organized as follows. Section 2 discusses the analytical framework of how financial development and economic growth are related. The role of financial repression is important in this relationship. Model, data and econometric methodology are described in Section 3. This section also explains the construction of the two summary measures for financial development and financial repression. To construct a summary index representing the overall level of financial repression in the Malaysian financial system, we collect data on various types of financial restraints, including interest rate controls, directed credit programs, and liquidity and reserve requirements. In Section 4, we provide an empirical assessment of the effect of real interest rate, financial repression and real per capita GDP on financial development. The ECM-based causality tests are performed to examine the dynamic causal relationship between finance and growth. In Section 5, we highlight a systematic relationship between financial repression, financial development and economic growth. Finally, we conclude in the Last section.

2. Analytical framework

2.1. Financial development and growth

Economists hold different perspectives on the theoretical link between financial development and economic growth. Schumpeter (1911) contends that the services provided by financial intermediaries are essential drivers for innovation and growth. A well developed financial system channels financial resources to the most productive use. The alternative explanation initiated by Robinson (1952) argues that finance does not exert a causal impact on growth. Instead, financial development follows economic growth as a result of higher demand for financial services. When an economy grows, more financial institutions, financial products and services emerge in the markets in response to higher demand of financial services.

The literature in this area of study is generally more supportive of the argument put forward by Schumpeter (1911). This line of argument was later formalized by McKinnon (1973) and Shaw (1973), and popularized by their followers Fry (1988) and Pagano (1993). McKinnon (1973) considers an outside money model in which all firms are confined to self-finance. Hence, physical capital has a lumpy nature where firms must accumulate sufficient savings in the form of monetary assets to finance the investment projects. In this sense, money and capital are viewed as complementary assets where money serves as the channel for capital formation ('complementarity hypothesis'). The 'debt-intermediation' view proposed by Shaw (1973) is based on an inside money model. Shaw (1973) argues that high interest rates are essential in attracting more saving. With more supply of credit, financial intermediaries promote investment and raise output growth through borrowing and lending. The endogenous growth literature is in line with this argument that financial development has a positive impact on the steady state growth.[7]

[7] See Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), and Bencivenga et al. (1995), among others.

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However, an expansion of financial systems may also be induced by economic growth. That is to say economic growth may create demand for more financial services and hence the financial system will grow in response to economic expansion. As economic activities grow, there will be more demand for both physical and liquid capital. Hence, growth in the real sector induces the financial sector to expand, and thereby increasing competition and efficiency in the financial intermediaries and markets (Berthelemy and Varoudakis, 1996). Importantly, the cost of financial services involves a significant fixed component so that the average costs will fall if the volume of transactions increases. Therefore, wealthier economies have a greater demand for financial services and are more able to afford a costly financial system. Since transaction volume is positively associated with the level of income, financial institutions will emerge once some critical level of income is reached.

2.2. Financial liberalization and repression

It is widely recognized that financial liberalization is an integral part of financial sector development. As such, policies on dismantling interest rate controls and other restrictions on banking operations may have important implications for financial development and hence economic growth. Financial liberalization may induce financial fragility or deepen the financial system but its long-term benefits on the economy are ambiguous, from both empirical and theoretical perspectives. There are several postulates why financial liberalization and financial repression can have important effects on financial development.

The McKinnon–Shaw school of thought proposes that government restrictions on the operation of the financial system such as interest rate ceiling, direct credit programs and high reserve requirements (dubbed financial repression) may hinder financial deepening. This may in turn affects the quality and quantity of investments and retards the development in the financial systems. Therefore, the McKinnon–Shaw financial repression paradigm implies that a poorly functioning financial system may negatively influence economic growth. In the simple AK model which involves financial factors presented by Pagano (1993), financial sector policies – which may include interest rate controls and reserve requirements – affect the amount of resources available for financial intermediating activities. Similarly, the financial endogenous growth developed by King and Levine (1993b) also shows that financial repression may have a negative impact on financial development. In this case, financial development is less likely to be effective in stimulating economic growth in the presence of a repressed financial system. In fact, the cross-country evidence of Rossi (1999) suggests that financial restraints can hamper financial development.

However, empirical observation suggests that financial liberalization, if carried out inappropriately, may induce destabilization in the financial system and trigger financial crises. Stiglitz (2000) argues that the increased frequency of financial crises is closely associated with financial market liberalization. Liberalization is systematically related to greater instability since capital flows are cyclical in nature, and this worsens economic fluctuations. As Arestis and Demetriades (1999a,b) pointed out, the financial liberalization hypothesis is based on a set of unrealistic assumptions, including perfect competition, perfect information, a sound institutional framework, and limited influence of stock markets. The fact that these assumptions are unlikely to be met in practice may explain for the failure of the financial liberalization programs undertaken by many developing countries, particularly in the 1970s. On the other hand, in countries with imperfect financial markets, certain government policies, which may include financial repression in the form of directed credit programs, interest rate controls and high required reserves, are able

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to address market failures and lead to higher financial development (Stiglitz, 1994). For instance, a lack of credit encourages the issue of more equity to finance business expansion given that this may lower the cost of capital. Directed credit programs could channel resources to high technological spill-over sectors. Similarly, Mankiw (1986) suggests that government intervention such as providing a credit subsidy and acting as a lender for certain borrowers can substantially improve the efficiency of credit allocation. Time series evidence produced by Arestis and Demetriades (1997) and Demetriades and Luintel (2001) show that financial repression in Korea resulted in a large positive effect on financial development. They attribute this finding to the presence of sound governance in Korea.

2.3. Interest rate restrictions

The McKinnon–Shaw framework suggests that interest rate controls may distort the economy in several ways. First, it may discourage entrepreneurs from investing in high risks and yet potentially high-yielding investment projects. Second, financial intermediaries may become more risk averse and practise preferential lending to established borrowers. Third, borrowers who obtain their funds at relatively low costs may prefer to invest in only capital intensive projects. Hence, McKinnon (1973) and Shaw (1973) argue in favor of liberalizing the financial sector by way of removing interest rate controls and allowing the market to determine its own credit allocation.

However, some counter arguments suggest that liberalizing interest rate may not necessarily lead to higher financial depth. For instance, with deposit insurance, the absence of interest rate control may result in overly risky lending behavior among the banks (McKinnon and Pill, 1997). Using a dynamic model of moral hazard, Hellmann et al. (2000) show that an increase in banking competition as a result of liberalizing the financial sector – including removing interest rate restraints – could result in a weaker banking system. Studies have also showed that a significant increase in interest rates, which often follows from interest rate liberalization, is systematically related to financial crises (see Demirguc-Kunt and Detragiache, 1998a,b). In fact, Stiglitz (1994) argues that interest rate restraints may lead to higher financial saving in the presence of good governance in the financial system. When depositors perceive the restrictions as policies aimed at enhancing the stability of the financial system, they may well be more willing to keep their saving in the form of bank deposits, and thereby increasing the depth of the financial system. Keeping interest rate at low levels could also raise the average quality of the borrowers. Hence, the theoretical impact of a changing interest rate on financial sector development is unclear.

3. Data and methodology

3.1. Measures of financial development

Financial systems can be broadly classified into bank-dominated (German–Japanese model) and capital market-dominated systems (Anglo-Saxon model).[8] One of the key features of the Malaysian financial system is the presence of a large number of small and medium sized firms. In most private

[8] Bank-based or market-based systems may have different impacts on economic growth. A bank-based financial system tends to promote long term economic growth as banks tend to offer longer term loans to the entrepreneurs. In contrast, a market-based financial system is more likely to have short-term effects as firms are primarily concerned with their immediate performance.

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firms, families still retain a significant control of the management which is a phenomenon not very common in an advanced financial system (Claessens et al., 1999, p. 165). Another feature is the limited development of the financial markets over the last 30 years. A majority of the companies in Malaysia are usually not listed and hence the more plausible source of finance is from banks rather than financial markets. The market concentration ratio is rather high for Malaysia as compared to other more advanced financial markets because market capitalization is highly concentrated in the hands of the ten largest firms. On these grounds, the Malaysian financial system can be described as a bank-based system rather than a market-based system. Thus, the use of bank-based financial proxies is more appropriate to study the issue at hand.[9]

The selection of key variables to represent the level of financial services produced in an economy and how to measure the extent and efficiency of financial intermediation are the major problems in an empirical study of this nature. Construction of financial development indicators is an extremely difficult task due to the diversity of financial services catered for in the financial systems. Furthermore, there is a diverse array of agents and institutions involved in the financial intermediation activities. The extent of financial deepening is best measured by the intermediaries' ability to reduce information and transaction costs, mobilize savings, manage risks and facilitate transactions. The idea is very simple but there is no directly measurable or reliable data available. Despite all efforts made by researchers to refine and improve the existing measures, the financial proxies used are still far from satisfactory.

Traditionally, easily available monetary aggregates such as M2 or M3 as a ratio of nominal GDP are widely used in measuring financial deepening. However, these are not very good proxies for financial development since they reflect the extent of transaction services provided by financial system rather than the ability of the financial system to channel funds from depositors to investment opportunities. The availability of foreign funds in the financial system also renders the monetary aggregates an inadequate measure of financial development. As an alternative measure, bank credit to the private sector is often argued to be a more superior measure of financial development. Since the private sector is able to utilize funds in a more efficient and productive manner as compared to the public sector, the exclusion of credit to the public sector better reflects the extent of efficient resource allocation. Developed by King and Levine (1993a), another commonly used variable is the ratio of commercial bank assets divided by commercial bank plus central bank assets which measures the relative importance of a specific type of financial institution, i.e., the commercial banks in the financial system. The basic idea underlying this measure is that commercial banks are more likely to identify profitable investment opportunities and therefore make more efficient use of funds than central banks.

In most cases, these variables are highly correlated and yet there is no uniform argument as to which proxies are most appropriate for measuring financial development. This justifies the need to construct an index as a single measure that represents the overall development in the financial sector by taking the relevant financial proxies into account. We use logarithm of liquid liabilities (or M3) to nominal GDP (M), logarithm of commercial bank assets to commercial bank assets plus central bank assets (A), and logarithm of domestic credit to private sectors divided by nominal GDP (P) as the proxies for financial depth. Using these three variables, we develop a summary measure for financial depth using principal component analysis that sufficiently deals with the problems of multi-collinearity and over-parameterization as an overall indicator of the level of financial development.[10]

[9] See Thangavelu and Ang (2004) for an empirical analysis that uses both bank-based and market-based financial indicators to assess the finance-growth link for Australia.

[10] Principal component analysis has traditionally been used to reduce a large set of correlated variables into a smaller set of uncorrelated variables, known as principal components (see Stock and Watson, 2002a,b).

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Table 1
Principal component analysis for financial depth index

	PCA 1	PCA 2	PCA 3
Eigenvalues	2.830	0.149	0.021
% of variance	0.943	0.050	0.007
Cumulative %	0.943	0.993	1.000
Variable	Vector 1	Vector 2	Vector 3
M	−0.580	0.519	−0.628
A	−0.564	−0.812	−0.149
P	−0.588	0.268	0.764

Notes: *M* = logarithm of liquid liabilities (or M3) to nominal GDP; *A* = logarithm of commercial bank assets to commercial bank assets plus central bank assets; and *P* = logarithm of domestic credit to private sectors divided by nominal GDP.

Theoretically, this new index for financial development is able to capture most of the information from the original dataset which consists of three financial development measures.

Table 1 presents the results obtained from principal component analysis. The eigenvalues indicate that the first principal component explains about 94.3% of the standardized variance, the second principal component explains another 5.0% and the last principal component accounts for only 0.7% of the variation. Clearly, the first principal component, which explains the variations of the dependent variable better than any other linear combination of explanatory variables, is the best measure of financial development in this case. The first principal component is computed as a linear combination of the three standard measures of financial development with weights given by the first eigenvector. After rescaling, the individual contributions of *M*, *A* and *P* to the standardized variance of the first principal component are 33.5%, 32.6% and 33.9% respectively. We use these as the basis of weighting to construct a financial depth index, denoted as FD.

3.2. Construction of financial policy variable

To construct an index for financial repression, we follow the approach adopted by Demetriades and Luintel (1997, 2001). This involves the consideration of interest rate controls, direct credit programs, and statutory reserve requirements. We collect eight series for these repressionist policies. Five of them are interest rate controls, including a minimum lending rate, a maximum lending rate, a minimum deposit rate, a maximum deposit rate, and a maximum lending rate for priority sectors. These policy controls are translated into dummy variables which take the value of 1 if a control is present and 0 otherwise. The remaining three policies are directed credit programs, statutory reserve ratio, and a liquidity ratio, which are measured in percentage. Similar to the above, a summary measure of financial repression which represents the joint impacts of the financial repressionist policies is developed using principal component analysis. The inverse of this measure can be interpreted as the extent of financial liberalization.

The estimated results are given in Table 2. The first principal component is computed as a linear combination of the three standard measures of financial development with weights given by the first eigenvector. In this case, we extract the six largest principal components which are able to capture 96.9% of the information from the original data set. The remaining principal components are not considered since their marginal information content is relatively small. We adjust the percentages of variance to make sure that their absolute values sum up to one. These adjusted values are then used as the weights to compute the principal component. For instance, the first

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Table 2
Principal component analysis for financial repression index

	PCA 1	PCA 2	PCA 3	PCA 4	PCA 5	PCA 6	PCA 7	PCA 8
Eigenvalues	3.986	1.680	0.801	0.651	0.358	0.277	0.148	0.099
% of variance	0.498	0.210	0.100	0.081	0.045	0.035	0.018	0.012
Cumulative %	0.498	0.708	0.808	0.890	0.935	0.969	0.988	1.000
Variable	Vector 1	Vector 2	Vector 3	Vector 4	Vector 5	Vector 6	Vector 7	Vector 8
PSL	−0.417	0.111	0.343	−0.136	0.038	−0.790	0.123	−0.193
SRR	−0.215	−0.547	0.460	−0.160	0.505	0.330	−0.076	−0.219
CLR	0.339	−0.368	0.513	−0.006	−0.441	−0.078	0.333	0.419
PSR	−0.430	0.188	0.095	−0.147	−0.507	0.447	0.395	−0.370
MIL	0.390	0.160	0.374	0.548	−0.100	−0.010	−0.196	−0.577
MAL	−0.222	0.567	0.419	0.287	0.291	0.235	0.052	0.478
MID	0.300	0.358	0.281	−0.714	−0.096	0.076	−0.420	−0.036
MAD	0.435	0.207	−0.065	−0.203	0.434	−0.015	0.703	−0.197

Notes: PSL = priority sector (native Malays community) lending target rate, SRR = statutory reserve ratio, CLR = commercial bank liquidity ratio, PSR = maximum lending rate for priority sector, MIL = minimum lending rate, MAL = maximum lending rate, MID = minimum deposit rate, and MAL = maximum deposit rate.

principal component, which accounts for 49.8% of the total variation of the policy variables, has a weight of 49.8/96.9. By setting 1960 as the base year, the resulting index after recalling is presented in Fig. 1. Interestingly, the index coincides rather well with the policy changes that took place in Malaysia during the sample period. A rise in the index indicates an increase in financial repression.

As is evident in the index, the extent of financial repression from 1960 to 1970 appears to be quite moderate. However, the index begins to move upwards from 1971 onwards mainly due to the increase in the statutory reserve ratio. 1975 saw a huge jump in the index, coinciding with the implementation of direct credit programs. During the year, at least 50% of the total lending made by banks must be advanced to the *bumiputra* (native Malays) community. The jump was subsequently mitigated when the target rate was reduced to only 20% in 1976, and not implemented in 1977. The rebound in 1978 primarily reflected the reintroduction of this policy. A major reform in interest rate policy occurred in late 1978 when the Central Bank allowed banks to determine their own interest rates. 1985 saw another increase in the level of financial repression when liquidity ratio was raised and banks were required to peg their interest rates with the two leading domestic banks. The pegged

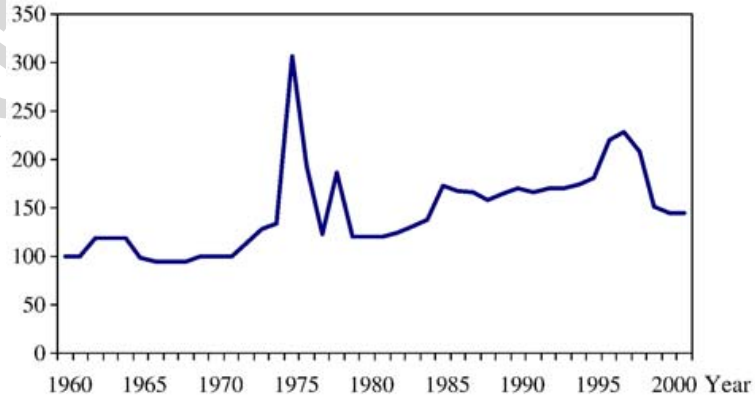

Fig. 1. Financial repression index.

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interest rate regime was later abolished in 1987. The index remained fairly stable before the onset of the Asian financial crisis. In 1997, several interventions on interest rates were introduced to mitigate the impacts of the crisis. After the crisis, there were signs that liquidity controls were loosened through a significant reduction in the statutory reserve ratio.

3.3. Data source

Annual data covering the period 1960–2001 were used in the study. The data series were directly obtained or compiled from Economic Report of the Ministry of Finance, Annual Report of Bank Negara Malaysia, Money and Banking in Malaysia (1994) of Bank Negara Malaysia, Monthly Statistical Bulletin of Bank Negara Malaysia, World Development Indicators (2003) of the World Bank, and International Financial Statistics (2004) of the International Monetary Fund. Except for real interest rate, all data series are measured in natural logarithms so that they can be interpreted in growth terms after taking the first difference.

3.4. Econometric methodology

Based on the theoretical arguments presented above, we can describe the financial depth relationship as follows:

$$\mathrm{FD}_t = f(\mathrm{ED}_t, \mathrm{RI}_t, \mathrm{FR}_t) \tag{1}$$

where FD_t refers to the financial development index and ED_t is the level of economic development, measured by logarithmic per capita real GDP. To avoid the issues of omitted variable bias, we include two conditioning variables, RI_t and FR_t, in the model following the theoretical considerations set out in the preceding section.[11] RI_t refers to the real interest rate and FR_t is an index which measures the extent of financial repression. We include five dummy variables in the estimation to account for the oil crises in 1973 and 1979, the global economic recession in 1985, the Asian financial crisis in 1997–98, and the world trade recession in 2001.

Our empirical estimation has two objectives. The first is to examine how the variables are related in the long-run. The second is to examine the dynamic causal relationships between the variables. We construct a 4-variable VAR model for our estimation purpose. The sensitivity of the results is then checked using the three standard measures for financial development. A vector autoregressive (VAR) approach serves our estimation purpose well for several reasons: 1) it is possible to distinguish between the short-run and long-run causality if the variables are cointegrated, 2) it is common for macroeconomic variable to be affected by its own past value and hence the finance-growth nexus should be viewed not only in a dynamic manner but also as an autoregressive process, and 3) it avoids the endogeneity problems by treating all variables as potentially endogenous.

The testing procedure involves three steps. We begin by testing the existence of unit roots by using the Augmented Dickey–Fuller (ADF) test. The second step is to test for cointegration using the Johansen approach for each of the VARs constructed in levels. Our causality tests are preceded by cointegration testing since the presence of cointegrated relationships have implications for the way in which causality testing is carried out. If cointegration is detected, the third step is to test for causality by employing the appropriate types of causality tests available in the recent literature. The presence of cointegrated relationships is consistent with the economic theory which predicts that finance and output have a long-run equilibrium relationship.

[11] According to Lutkepohl (1982), the formulation of a simple bivariate VAR may be subject to omitted variable bias.

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According to Engle and Granger (1987), cointegrated variables must have an error correction representation in which an error correction term (ECT) must be incorporated into the model. Accordingly, a vector error correction model (VECM) is formulated to reintroduce the information lost in the differencing process, thereby allowing for long-run equilibrium as well as short-run dynamics. For the 4-variable case with one cointegrated relationship, the VECM can be expressed as follows:

$$\begin{aligned}\Delta \mathrm{FD}_t = {} & \mu_1 + \alpha_{11}\mathrm{ECT}_{t-1} + \sum_{j=1}^{p-1}\phi_{1j}\Delta \mathrm{FD}_{t-j} + \sum_{j=1}^{p-1}\theta_{1j}\Delta \mathrm{ED}_{t-j} \\ & + \sum_{j=1}^{p-1}\psi_{1j}\Delta \mathrm{RI}_{t-j} + \sum_{j=1}^{p-1}\omega_{1j}\Delta \mathrm{FR}_{t-j} + \varepsilon_{1t}\end{aligned} \tag{2.1}$$

$$\begin{aligned}\Delta \mathrm{ED}_t = {} & \mu_2 + \alpha_{21}\mathrm{ECT}_{t-1} + \sum_{j=1}^{p-1}\phi_{2j}\Delta \mathrm{FD}_{t-j} + \sum_{j=1}^{p-1}\theta_{2j}\Delta \mathrm{ED}_{t-j} \\ & + \sum_{j=1}^{p-1}\psi_{2j}\Delta \mathrm{RI}_{t-j} + \sum_{j=1}^{p-1}\omega_{2j}\Delta \mathrm{FR}_{t-j} + \varepsilon_{2t}\end{aligned} \tag{2.2}$$

$$\begin{aligned}\Delta \mathrm{RI}_t = {} & \mu_3 + \alpha_{31}\mathrm{ECT}_{t-1} + \sum_{j=1}^{p-1}\phi_{3j}\Delta \mathrm{FD}_{t-j} + \sum_{j=1}^{p-1}\theta_{3j}\Delta \mathrm{ED}_{t-j} \\ & + \sum_{j=1}^{p-1}\psi_{3j}\Delta \mathrm{RI}_{t-j} + \sum_{j=1}^{p-1}\omega_{3j}\Delta \mathrm{FR}_{t-j} + \varepsilon_{3t}\end{aligned} \tag{2.3}$$

$$\begin{aligned}\Delta \mathrm{FR}_t = {} & \mu_4 + \alpha_{41}\mathrm{ECT}_{t-1} + \sum_{j=1}^{p-1}\phi_{4j}\Delta \mathrm{FD}_{t-j} + \sum_{j=1}^{p-1}\theta_{4j}\Delta \mathrm{ED}_{t-j} \\ & + \sum_{j=1}^{p-1}\psi_{4j}\Delta \mathrm{RI}_{t-j} + \sum_{j=1}^{p-1}\omega_{4j}\Delta \mathrm{FR}_{t-j} + \varepsilon_{4t}\end{aligned} \tag{2.4}$$

where ε_t's are Gaussian residuals and $\mathrm{ECT}_{t-1}=\mathrm{FD}_{t-1}+(\beta_{21}/\beta_{11})\mathrm{ED}_{t-1}+(\beta_{31}/\beta_{11})\mathrm{RI}_{t-1}+(\beta_{41}/\beta_{11})\mathrm{FR}_{t-1}$ is the normalized cointegrated equation. There are two sources of causation i.e. through the ECT, if $\alpha \neq 0$, or through the lagged dynamic terms. Given the two different sources of causality, we can perform three different causality tests i.e. short-run Granger non-causality test, weak exogeneity and strong exogeneity tests. In Eq. (2.1), to test $\Delta \mathrm{ED}_t$ does not cause $\Delta \mathrm{FD}_t$ in the short-run, we examine the significance of the lagged dynamic terms by testing the null H_0 : all $\theta_{1j}=0$ using the Wald test. Non-rejection of the null implies growth does not Granger-cause finance in the short-run. The weak exogeneity test, which is a notion of long-run non-causality test, requires satisfying the null $H_0{:}\alpha_{11}=0$. It is based on a likelihood ratio test which follows a χ^2 distribution. Finally, we can also perform the strong exogeneity test which imposes stronger restrictions by testing the joint significance of both the lagged dynamic terms and ECT due to Charemza and Deadman (1992, p. 267) and Engle et al. (1983). That is, the strong exogeneity test requires Granger non-causality and weak exogeneity. In particular, $\Delta \mathrm{ED}_t$ does not cause $\Delta \mathrm{FD}_t$ if the null H_0: all $\theta_{1j}=\alpha_{11}=0$ is not

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Table 3
Johansen cointegration tests

Model	Trace statistic (λ_{trace})				Maximum eigenvalue statistic (λ_{max})			
	$r=0$	$r\leq 1$	$r\leq 2$	$r\leq 3$	$r=0$	$r=1$	$r=2$	$r=3$
Model A (FD, ED,RI, FR)	53.361**	23.676	11.740	4.699	29.684**	11.936	7.041	4.699
Model B (M, ED, RI, FR)	59.657***	26.324	10.858	4.976	33.332***	15.466	5.882	4.976
Model C (A, ED, RI, FR)	46.844*	22.454	9.399	2.466	24.390	13.054	6.934	2.466
Model D (P, ED,RI, FR)	50.968**	24.299	13.392	4.902	26.668*	10.907	8.490	4.902

Notes: *, ** and *** indicate 10%, 5% and 1% level of significance respectively. The optimal lag length (p) is one for all models.

rejected. The strong exogeneity test does not distinguish between the short-run and long-run causality but it is a more restrictive test which indicates the overall causality in the system.

4. Empirical findings

The ADF test results show that all variables are non-stationary in their levels but become stationary after taking the first difference. Hence, we conclude that all series are $I(1)$ at the 5% level of significance.[12] Since the Johansen approach is sensitive to the lag length used, we conduct a series of nested likelihood ratio tests on first-differenced VARs to determine the optimal lag length (p) prior to performing cointegration tests. Given the sample size, we have considered a maximum lag length of four. The optimal lag length is found to be one for all models. We follow this lag structure for the rest of the estimations. Cointegration tests are performed for each VAR models at levels.

In Table 3, both the results of trace test and maximum eigenvalue test unanimously point to the same conclusion that there is one cointegrated equation in model A, B and D but only some weak support for cointegration is found when commercial banks' relative assets (A) is used as the measure of financial development in model C. This is consistent with the results of McCaig and Stengos (2005) who found the causal link between financial development and economic growth to be considerably weaker when the ratio of commercial to central bank assets is used as the indicator for financial development. Nevertheless, we conclude that there is one cointegrated relationship in all models.

Using likelihood ratio tests, the five dummy variables used to account for various macroeconomic shocks are found to be statistically significant. Table 4 presents the cointegrating vectors and speed of adjustment coefficients for each model. A Lagrange Multiplier (LM) test is performed to examine for evidence of first order serial correlation in the residuals. As some evidence of serial correlation is found when only one lag is chosen, we also check sensitivity of the results by considering a lag order of two for each model. By normalizing the coefficient of FD_t to one, we obtain the long-run elasticities of financial depth with respect to other variables. Overall, the estimated coefficients are reasonable in terms of both sign and magnitude. It is

[12] The results are not reported here to conserve space. They are available upon request.

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Table 4
Cointegrated equations

p	Model A: (FD, ED, RI, FR)		Model B: (M, ED,RI, FR)		Model C: (A, ED,RI, FR)		Model D: (P, ED,RI, FR)	
	1	2	1	2	1	2	1	2
Intercept	−9.234	−9.419	−8.753	−9.261	−5.260	−2.653	−16.174	−16.189
ED_t	1.217***	1.133***	1.114***	1.103***	1.535	0.348***	2.114***	1.949***
RI_t	−0.146***	−0.064***	−0.136***	−0.075***	−0.708***	−0.068***	−0.201***	−0.078***
FR_t	−0.144*	−0.047	−0.063	−0.003	−0.874**	−0.035	−0.262**	−0.102
α_{11}	−0.068*	−0.169*	−0.146**	−0.275*	0.004	−0.046	−0.068*	−0.157*
LM	32.113***	22.717	30.101**	20.392	26.014*	30.022**	38.276***	23.397

Notes: Number of observations (n)=42; number of cointegrated vectors (r)=1; p is the lag length chosen; the normalized variable is FD_t; $\alpha_{11}$is the loading factor which measures the speed of adjustment when there is a deviation from the long-run equilibrium; LM refers to Lagrange Multiplier test statistics for no first order serial correlation; and *, ** and *** indicate 10%, 5% and 1% level of significance, respectively.

evident that output and finance are positively related in the long-run. However, we find a negative real interest rates semi-elasticity, and a negative elasticity with respect to financial repression. This suggests that raising the real interest rate has a negative impact on the development of the financial sector. The results are consistent with Arestis et al. (2002) for Greece, India and the Philippines. On the other hand, the results also point to the importance of removing financial constraints imposed on the financial system in order to deepen the financial system, which corroborate the findings of Arestis et al. (2002) and Demetriades and Luintel (1996, 1997) for the Indian experience. As to the magnitude, the results suggest that output has stronger effects on financial depth. But the degrees of influence of the real interest rate and financial repression on financial depth are mixed. The loading factors, which measure the speed of adjustment towards the long-run equilibrium value, are significant, and correctly signed (negative) except for model C. It is evident that model B adjusts faster to return the long-run equilibrium relative to other models.

Given the results of cointegration tests, we perform the ECM-based causality tests, considering both one and two lags. The results reported in Table 5 reveal that there is no short-run Granger causality between finance and growth observed in all models, at the 5% level of significance.[13] We find evidence of output growth causing (in the Granger sense) financial development in the long-run but no feedback relationship is observed. Such evidence is further supported by the results of the strong exogeneity tests which show the overall causality for both short-run and long-run.[14] Contrary to Luintel and Khan (1999) in which a feedback relationship between finance and growth for Malaysia is reported for the period 1956–1994,[15] our findings indicate that growth exerts a positive and uni-directional causal effect on finance in the long-run. Our results are, however, consistent with Arestis and Demetriades (1997) for the U.S. experience and Thangavelu

[13] Results of the causal relationships between other variables are not the main focus of the current study and hence not reported. Furthermore, real interest rate and financial repression are policy variables which are often treated "exogenously" in the literature.

[14] The results of no causality found in model C is consistent with the finding of a weak support for cointegration in the preceding cointegration estimation. By choosing the alternative conclusion of no cointegration for model C, an error-correction representation in not required so the short-run Granger causality tests can be performed on a first-differenced VAR. The results indicate that the conclusion of no causality remains unchanged.

[15] In Luintel and Khan (1999), the ratio of M2 to GNP was used as the measure of financial development.

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Table 5
Causality tests between ΔFD and ΔED

H_0: ΔED ↛ ΔFD	Lags	SR Granger non-causality test (H_0: all $\theta_{1j}=0$)	Weak exogeneity test (H_0: $\alpha_{11}=0$)	Strong exogeneity test (H_0: all $\theta_{1j}=\alpha_{11}=0$)
Model A	1	0.234	3.114*	3.003
(FD, ED, RI, FR)	2	1.550	4.019**	8.656**
Model B	1	1.232	4.905**	4.560
(*M*, ED, RI, FR)	2	1.864	5.531**	8.262**
Model C	1	0.523	0.862	1.118
(*A*, ED, RI, FR)	2	0.710	0.447	1.239
Model D	1	0.008	3.520*	4.542
(*P*, ED, RI, FR)	2	2.266	3.612*	12.348***

H_0: ΔFD ↛ ΔED	Lags	SR Granger non-causality test (H_0: all $\phi_{2j}=0$)	Weak exogeneity test (H_0: $\alpha_{21}=0$)	Strong exogeneity test (H_0: all $\phi_{2j}=\alpha_{21}=0$)
Model A	1	0.383	0.781	0.965
(FD, ED, RI, FR)	2	0.728	0.325	0.964
Model B	1	0.160	0.246	0.322
(*M*, ED,RI, FR)	2	0.564	1.509	1.705
Model C	1	1.186	0.777	1.897
(*A*, ED, RI, FR)	2	0.395	0.065	0.517
Model D	1	0.276	1.028	1.106
(*P*, ED, RI, FR)	2	0.772	0.028	0.782

Notes: number of observations (n)=42; number of cointegrated vectors (r)=1; and *, ** and *** indicate 10%, 5% and 1% level of significance respectively.

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and Ang (2004) for the Australian experience. The findings in this paper are also in line with the time series evidence of Demetriades and Hussein (1996) who find little support for the finance-led growth hypothesis for 16 countries.

Although financial deepening is clearly observed following a series of financial sector reforms introduced over the years, our results, however, suggest no sign of economic improvement fueled by expansion in the financial sector. In developing countries, financial intermediation affects economic growth mainly through mobilizing savings and allocating these funds to productive investment projects which generate good returns. Based on our findings, the financial intermediaries in Malaysia do not seem to be efficient in ameliorating informational asymmetries, reducing transaction costs and allocating resources.

As highlighted previously, a large number of cross-country studies have consistently demonstrated that financial development has a positive impact on economic growth. However, consistent with the findings of Demetriades and Hussein (1996), the analysis presented in this paper provides little support for the view that finance leads to higher growth in Malaysia. Existing literatures have argued that the strength of the relationship between finance and growth may depend on institutional quality (Arestis and Demetriades, 1999a,b; Demetriades and Andrianova, 2004), legal system (Demirguc-Kunt and Maksimovic, 1998; La Porta et al., 1997, 1998; Levine, 1998, 1999), inflation rate (Rousseau and Wachtel, 2002), and the level of financial development (Rioja and Valev, 2004). However, these factors are unlikely to account for the absence of a finance-led growth effect in Malaysia, given that its institutional quality

and legal system are relatively good, inflation has always been well-managed by the central bank, and its level financial development is relatively high. Why has financial development not led to higher growth in Malaysia? We offer the following plausible explanations:

1) Before a restriction on borrowing from abroad was put into place in 1995, many large organizations in Malaysia resorted to foreign funds instead of relying on the domestic banks to fund their business expansion projects. This suggests that the domestic banking sector has not been playing a vital role in allocating resources. This is further supported by the findings of Jomo (1998) which reveal that the Malaysian banks did not channel resources to the most productive use in the early 1990s. Most lending was issued for the purchase of shares and real estate property rather than for investment in productive activities. This led to bubbles in the property sector and triggered much speculative activities in the share market prior to the financial crisis in 1997–98.
2) The overly risky behavior adopted by the domestic banks in their lending policy have resulted in mismanagement of assets and generated much larger non-performing loans compared to the foreign banks during the crisis period of 1997–98. Interest rate spreads did not gradually decline over the years. This high profit margin phenomenon suggests that efficiency in the banking sector has not been achieved. By examining the banking efficiency in the East Asian banks for the period of 1992–96, Laeven (1999) finds that the banking efficiency in Malaysia stays more or less constant at the initial level. The recent banking sector reforms further reflect that the existing financial system in Malaysia is still fragile and inefficient.
3) A key feature in the financial system of Malaysia is the presence of the Employees Provident Fund (EPF) which is a social security savings plan that requires both employers and employees to make monthly contributions to secure worker retirements. These contractual savings make up a large proportion of the total savings in Malaysia; banks therefore have a less significant role to play in mobilizing savings and allocating resources. Furthermore, although a high saving rate may have contributed to the economic development in Malaysia, there is little guidance provided as to whether the funds deposited at the EPF have been allocated to the most productive sectors efficiently.

5. Financial repression and the finance-growth nexus

The above plausible reasons, though may account for why a causality running from finance to growth is not observed in Malaysia, cannot be tested with the design of the existing empirical framework. Based on the empirical analysis in this paper, it appears that an important factor that leads to this conclusion is that financial repression has had a detrimental effect on the development of the Malaysian financial system. In Malaysia, repressionist measures such as interest rate controls, banking sector restrictions, and directed credit programs coexist with a structuralist policy of promoting the creation of more financial institutions (Yaakop, 1988). These financial sector policies, liberalization or repression, and the development on the financial system that follows, can have significant impacts on the relationship between financial development and economic growth.

To gain more insight into this relationship and as a suggestion as to where research in this area might proceed, we compare two sets of results documented in several other studies: 1) how financial repression affects financial deepening; and 2) how finance and growth are causally related. The analysis reported in Table 6 reveals an interesting picture that the finding in this paper is not a unique phenomenon observed only in Malaysia. The eight countries analyzed in Table 6 are subject to much intervention on their financial systems in the form of directed credit programs and interest rate regulation, during the period under investigation. Since financial sector policies

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Table 6
Empirical evidence on the relationship between financial repression, financial development and economic growth

Country	Impact of FR on FD [sources]	Causal relationship [sources]
Egypt	Positive [Arestis et al., 2002]	? [N/A]
Korea	Positive [Arestis and Demetriades, 1997; Bandiera et al., 2000; Demetriades and Luintel, 2001]	FD ↔ EG [Demetriades and Hussein, 1996; Arestis and Demetriades, 1999a,b; Choe and Moosa, 1999]
Mexico	Positive [Bandiera et al., 2000]	FD ↔ EG [Arestis and Demetriades, 1999a,b]
Philippines	Positive [Arestis et al., 2002]	? [N/A]
Ghana	Negative [Bandiera et al., 2000]	? [N/A]
India	Negative [Demetriades and Luintel, 1996, 1997; Arestis et al., 2002]	FD ← EG [Demetriades and Hussein, 1996; Arestis and Demetriades, 1999a,b]
Malaysia	Negative [This paper]	FD ← EG [This paper]
Turkey	Negative [Bandiera et al., 2000]	FD ← EG [Demetriades and Hussein, 1996; Arestis and Demetriades, 1999a,b]

Notes: FR = financial repression index, FD = financial development, EG = economic growth, and N/A = not available. The causality results are based on the use of private credit as a ratio of GDP as the indicator for financial development. While extracting the results from these empirical studies, only statistically significant regression results are considered. The results taken from Bandiera et al. (2000) are based on dynamic GLS estimator. Although the main objective of Bandiera et al. (2000) is to examine the effect of financial sector reform on private saving, the finding of an increase in private saving due to lower financial liberalization or higher financial repression, as is evident in the case of Korea and Mexico, implies higher financial development. This is because when more savings enter into the financial systems, it allows more loans to be issued and this therefore increases financial intermediating activities.

may have important implications for financial development and thus economic growth, the relationship between financial development and economic growth for these countries may depend on how financial repression affects financial development.

In half of the eight countries reported, i.e., Egypt, Korea, Mexico and the Philippines, financial repression has a favorable effect on financial development. Interestingly, empirical evidence documented in other studies seems to suggest that finance and growth are jointly determined for the case Korea and Mexico. In the remaining four cases, Ghana, India, Malaysia and Turkey, financial deepening reacts inversely to the imposition of repressionist policies. Evidence produced by other studies as well as the existing study suggests that financial development follows economic growth in this case. Hence, it appears that how finance and growth are causally related in each country may reflect their experiences in relation to financial repression, when the financial systems are subject to extensive regulations.

We may summarize the evidence in Table 6 by saying that in five out of eight countries considered in Table 6, there appears to be evidence of a systematic relationship between financial repression, financial development, and economic growth. These observations point to an important implication that the causal relationship between finance and growth in these countries may differ with reference to their experiences of financial repression. In particular, three systematic patterns can be observed: 1) if financial repression has a positive impact on financial development, financial development and economic growth may be jointly determined, as is evident in the case of Korea and Mexico; 2) if financial repression exerts a negative influence in the process of financial development, causality is likely to run from growth to finance with no feedback relationship observed, based on the experiences of India, Malaysia and Turkey; and 3) in all countries where causality test results are available, finance follows growth. But only in the case where financial reforms are successfully carried out, in the sense that financial sector has deepened, is a feedback causal relationship observed. However, we are unable to make any inference on Egypt, the Philippines, and Ghana since to the best of our knowledge no causality test results are available for these countries.

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On the whole, it appears that financial sector policies that have a direct negative bearing on financial deepening are unlikely to have a finance-led effect on growth unless these policies work favorably on the financial systems. But more research is desirable to explore this hypothesis further given that the analysis provided here is limited to the available results reported in the previous studies as well as the current study. The results, however, do not preclude the possibility of a feedback relationship between finance and growth for countries which have not undertaken any financial sector reforms or imposed any restrictions on the financial systems.

6. Conclusions

In this paper, we attempt to address the difficult problem of measuring the depth of financial development and the extent of financial repression by using principal component analysis to construct the summary measures. The constructed index for financial repression captures several aspects of the financial sector policies including interest rate controls, directed credit programs, liquidity and reserve requirement, that are not fully represented by changes in the real interest rate.

Using multivariate cointegration techniques and by properly controlling for the various macroeconomic shocks experienced by Malaysia, our findings suggest that both financial repressionist policies and real interest rates affect financial deepening negatively. Our results also show that although financial sector reforms have enlarged the financial system, these policy changes do not appear to have led to higher long-run growth. Instead, financial deepening is an outcome of the growth process in Malaysia. Hence, our results offer support for the demand-following hypothesis that economic growth leads to higher financial development but not vice versa.

To gain more insight into the findings, we compare the results of Malaysia with the experiences of other countries and observe an interesting picture that could be further addressed using the approach in this paper. We are able to demonstrate a systematic pattern between financial repression, financial development, and economic growth. We argue that how financial repression impacts on financial development may have an implication on the causal relationship between finance and growth. Our conjecture is that for countries with financial repression works positively on financial development, the finance-growth nexus is likely to be a bi-directional one. On the other hand, if financial repression is harmful for the development in the financial system, then a finance-led growth seems unlikely. But more evidence is required to test this hypothesis. Previous studies that focus on testing the causal relationship between finance and growth have largely ignored the impact of financial repression on this relationship. Future research should look at how financial repression impacts on financial development while examining the causality between financial development and economic growth.

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