INTERNATIONAL JOURNAL OF FINANCE AND ECONOMICS
Int. J. Fin. Econ. **7**: 109–121 (2002)
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/ijfe.181

THE IMPACT OF FINANCIAL LIBERALIZATION POLICIES ON FINANCIAL DEVELOPMENT: EVIDENCE FROM DEVELOPING ECONOMIES

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ABSTRACT

We collect data on a number of financial restraints, including restrictions on deposit and lending interest rates and reserve and liquidity requirements, from central banks of six developing countries. We estimate the effects of these policies on financial development, controlling for the effect of economic development and using standard econometric techniques. We find that the effects of financial policies vary considerably across our sample of countries. Our findings demonstrate that financial liberalisation is a much more complex process than has been assumed by earlier literature and its effects on financial development are ambiguous. Copyright © 2002 John Wiley & Sons, Ltd.

JEL CODE: E5; N2

KEY WORDS: financial development; financial liberalization; cointegration analysis

1. INTRODUCTION

Max Fry was an excellent colleague and a very good friend, always there to help and discuss work. But one aspect Max was particularly helpful on is the paper prepared for this occasion. He suggested to us that it would be very fruitful to collect ourselves data on financial restraints, especially on developing countries, and then study their impact and effectiveness. Max, of course, wrote a great deal on financial liberalization, a proponent of the ideas supporting the thesis. However, he went about it in a very open-minded way, and was not prepared to accept it at any cost. In his address to the Cyprus Economic Society 1997 Annual Lecture (published in Ekonomia, Summer 1998) he discussed the 'Pitfalls and potential of financial liberalization', and warned of the importance of a number of prerequisites for successful financial liberalization policies. This paper is written in that spirit and based on his suggestion, and as such it is dedicated to Max's memory.

The role played by the financial sector in an economy can be important in determining economic growth. A growing empirical literature in fact demonstrates that the development of the financial system has positive effects on (i) the long-run rate of economic growth and/or (ii) the volume and/or efficiency of investment (Fry, 1995). However, the causal nature of this relationship is now known to exhibit considerable variation across countries (Demetriades and Hussein, 1996). This indicates that institutional factors or policies may play a critical role in determining how the process of financial development affects economic growth (Arestis and Demetriades, 1997). The importance of institutional factors is confirmed by Demirgüc-Kunt and Detragiache (1998), who demonstrate that institutional quality is inversely related to

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the incidence of financial fragility that usually follows episodes of financial liberalization. The relevance of financial liberalization policies is highlighted by Demetriades and Luintel (1996, 1997, 2001) who demonstrate that the direct effects of financial repression in some developing countries are much larger than, and in some instances opposite to, those emanating from changes in the real interest rate.

While the medium-term costs of financial liberalization in terms of heightened fragility of the financial system are now recognized, its longer-term benefits, albeit widely accepted, remain unproven. Earlier empirical literature, which attempted to capture these benefits by focusing on the cross-country relationship between the real interest rate and economic growth and/or the efficiency of investment (e.g. Gelb, 1989), is now believed to have been flawed. In this respect Stiglitz (address to the World Bank's 10th Annual Conference on Development Economics, 1998) argues that these regressions suffer from simultaneity and mis-specification problems. Arestis and Demetriades (1997) reinforce these criticisms focusing on the causality and heterogeneity issues, neither of which can be addressed satisfactorily in a cross-section framework. On the basis of available empirical literature, it can safely be concluded that there remains considerable scope for further research into the channels through which financial policies of various types, including financial liberalization, may affect economic performance. One such a channel is financial development. The focus of this paper is to examine empirically this particular venue of financial policies.

We provide an empirical assessment of the effects of financial policies, including financial liberalization, on financial development in six developing economies. The policy data were collected either directly from central banks or from official publications for a period of over forty years. Specifically, we collected data on two types of financial restraints, namely restrictions on interest rates and reserve and liquidity requirements. We estimate the effects of these policies on financial development using time series techniques. We find that the effects of financial policies on financial development vary considerably across countries. Our findings demonstrate that financial liberalization is a much more complex process than has been assumed by earlier literature and its effects on financial development are ambiguous.

The rest of the paper is organised as follows. Section 2 provides an outline of relevant literature and draws its implications for the effects of two types of financial policies on financial development. Section 3 provides a summary of the financial policies data set. Section 4 discusses the econometric methodology pursued, and Section 5 examines the empirical results. Section 6 summarizes and concludes.

2. FINANCIAL POLICIES AND FINANCIAL DEVELOPMENT: CONCEPTUAL ISSUES

There are valid reasons why financial policies, including financial restraints, can have important real effects on financial development. To start with, there are the seminal contributions of McKinnon (1973) and Shaw (1973), which predict that interest rate controls and directed credit programmes impede the process of financial deepening.[1] In contrast, there is a small but growing literature, which emphasizes financial market imperfections, including asymmetric information and imperfect competition, that arrives at conclusions that substantially qualify the predictions of the financial liberalization thesis (Stiglitz, 1994; Caprio, 1994; Gertler and Rose, 1996; Hellmann et al., 1996a,b, 2000).

Besides these macroeconomic approaches, there are also models belonging to the literature on banking that investigate the effects of financial regulation on risk-taking by banks (Kim and Santomero, 1988; Keely and Furlong, 1990; Gennotte and Pyle, 1991). While the recent episodes of financial fragility (e.g. Japan, East Asia) have vividly demonstrated that excessive risk-taking by financial institutions can trigger severe macroeconomic downturns, the above models do not explore the wider macroeconomic implications of these types of policies.

The empirical literature on the effects of financial policies has been recently growing rapidly. Existing macro-econometric studies focus on a number of Asian economies, and reveal that the effects of financial restraints may be very large but vary considerably across countries (e.g. Demetriades and Luintel, 1997; Demetriades et al., 1998). Cross-country growth regressions indicate that financial restraints, with perhaps the exception of controls on capital outflows, may hamper financial development (Rossi, 1999).

In the rest of this section we explore the likely macroeconomic effects of two broad types of financial policies, namely interest rate restraints and reserve, as well as liquidity, requirements. The first type of

financial policies are typically the primary focus of financial liberalization programmes while the second type of policies are indicative of the severity of financial repression.

2.1. Interest rate restraints

In McKinnon's (1973) and Shaw's (1973) framework, interest rate restraints inhibits financial development largely by depressing real interest rates which in turn affects adversely economic growth. In the McKinnon/Shaw framework, interest rate liberalization, by increasing the volume of bank assets and liabilities, enhances the development of the banking system. Others, however, have suggested that in the presence of information asymmetries, liberalization of interest rates may not necessarily lead to financial deepening (Schiantarelli et al., 1994). Indeed, the combination of asymmetric information with the provision of deposit insurance can lead to excessively risky lending strategies (McKinnon and Pill, 1997), and to potentially substantial increases in bad debts (Caprio, 1994). Furthermore, intense competition that usually follows financial liberalization lowers profits for banks which in turn erodes their franchise values, increasing the premium for external finance, and thus lowering banks' incentive for making 'good' loans (Caprio and Summers, 1994; Gertler and Rose, 1996; Hellmann et al., 1996b, 2000). This exacerbates the problems of moral hazard and gambling behaviour in the banking system, thereby increasing the riskiness of banks' portfolios which in turn may affect adversely the public's perception of the soundness of the banking system. Consequently, prudent bank behaviour is undermined (Hellman et al., 2000), with the probability of financial crises being enhanced substantially (Akerlof and Romer, 1993).

Indeed, some types of financial restraints, such as interest rate ceilings on deposit rates, by keeping profit margins within certain limits, can in fact reduce the problems of moral hazard and adverse selection (Stiglitz, 1994). In this way, financial restraints may reduce the riskiness of banks' portfolios by limiting banks' incentives to invest in assets that facilitate gambling. Consequently, interest rate ceilings can encourage financial development by enhancing the soundness of the domestic banking system (Arestis and Demetriades, 1997). In Hellman et al. (1994a,b, 1996a,b) these ideas are applied to deposit mobilization, which is crucial to many developing countries. Deposit rate controls in particular, ensure that competition will not drive the margin between lending and deposit rates down to zero. They are, thus, a powerful instrument to financial deepening by allowing private deposit markets to grow.

Furthermore, by limiting deposit rates at below competitive equilibrium rates, governments create rent opportunities, which the banking sector could utilize for what is termed 'educational advertising campaign', a tool of non-price competition which facilitates the mobilization of deposits, thereby enhancing further financial deepening. This argument has been taken a step further in Hellman et al. (2000) where it is demonstrated that in a dynamic model of moral hazard, competition has a harmful effect on banks' franchise value (the capitalised value of expected future profits). Deposit-rate controls as a tool of prudential regulation to prevent moral hazard, produces Pareto-efficient policies.[2]

2.2. Reserve and liquidity requirements

Advocates of financial liberalization consider reserve and liquidity requirements as a tax on financial intermediation, which widens the spread between deposit and loan interest rate and reduces the size of the financial system (Fry, 1995). Hence, the abolition of reserve requirements, by increasing the size of financial intermediation and removing the distortionary effects of the tax, is likely to result in a deeper financial system. This argument is implicitly based on the assumption that government revenue from reserve and liquidity requirements is used unproductively, probably to finance government consumption. If these resources are instead used to finance productive public investment, then this conclusion may not follow. Much of the literature on infrastructure, in fact, demonstrates that investment in public capital has large positive effects on the productivity of private capital (Aschauer, 1989; Lynde and Richmond, 1993; Nadiri and Mamuneas, 1994; Demetriades and Mamuneas, 2000). If this is the case then reserve and liquidity requirements are likely to boost economic growth, thereby also likely to enhance financial development. Additionally, reserve and liquidity requirement policies, if applied properly, may have more direct effects on the development of the financial system by ensuring that banks are sufficiently liquid in order to be able to

meet day-to-day withdrawals by depositors. Minimum reserve and liquidity requirements are particularly useful when money markets are not sufficiently deep or developed, which is frequently the case in developing countries. But even in 'deep' financial markets, reserve and liquidity requirements can play a useful role, especially when there is imperfect information about a bank's solvency. In principle, a bank that is solvent may still face an imbalance between short-term payments and short-term income; borrowing through the inter-bank market to close this liquidity gap is, of course, possible. However, frequent liquidity shortages may generate bad signals concerning solvency through the inter-bank market. As a result, wholesale banks may refuse to provide an illiquid bank with the necessary funds. Consequently, the illiquid bank may be forced to sell long-term assets at distress prices, lowering the value of its assets. Hence, what starts as a problem of liquidity may well be translated into a problem of insolvency (Dewatripont and Tirole, 1993).

3. FINANCIAL POLICIES AND OTHER DATA

The financial policies data used for this analysis have been uniquely constructed from information available in the Central Bank annual reports from each country for the period 1955 to 1997. The policies comprise interest rate controls and reserve and liquidity requirements. Table 1 summarizes the main financial policies for our sample of countries, and provides the basis for the construction of the two quantitative summary measures of financial restraints.

It is clear from Table 1 that the countries included in our sample have had different experiences in terms of the timing and speed of interest rate liberalization. Some countries such as South Korea, Greece, the Philippines and Egypt followed a very gradual process of financial liberalization while others such as Thailand abolished ceilings on lending and deposit rates within a very short period of time. What is interesting to note is that in all these countries, the government resorted to controls on both the lending and the deposit rates, which is in contrast to the experience of developed countries. The sequence of interest rate deregulation was also different across countries. In Greece and Egypt controls on lending and deposit rates were abolished simultaneously. In Thailand and the Philippines, deposit rates were liberalized first and then lending rates, while in South Korea the converse applied. It is also interesting to note that in the case of India, financial liberalization did not run smoothly and there have been some episodes of reform reversal.

The countries in the sample have different experiences regarding liquidity and reserve requirements. The Philippines and South Korea did not impose any formal liquidity ratios. This is in contrast to India which imposed high liquidity ratios where in the 1980s and the 1990s these ratios reached as high as 38.5%, and in Egypt where they reached 30% in the period 1960-90. Another country that resorted heavily to liquidity ratios in the 1980s was Greece, where banks were required to invest a certain fraction of their total deposits in short-term government bonds. However, these liquidity requirements were abolished in 1993. As for reserve requirements, all the countries in our sample have used reserve requirements for the conduct of monetary policy at some stage. Greece, the Philippines, South Korea, India and Egypt resorted to very high reserve requirements although in the 1990s Greece and South Korea lowered their reserve requirements considerably. The only exception is Thailand, where reserve requirements were set at very low levels throughout the sample period.

3.1. Construction of policy variables

In this sub-section we explain the construction of the policy variables used in the estimations. The number of policy variables was determined through statistical criteria, which included essentially the prevention of multicollinearity. This suggested keeping the number of policy variables as low as possible. Thus, controls on deposit and lending rates were merged into one summary measure labelled *IRR*. Specifically, *IRR* is an unweighted average of deposit rate and lending rate control dummies (which take the value of 1 if a control is present, and 0 otherwise). The high correlation between reserve and liquidity requirements suggested the construction of one summary measure, using the principal component method.

Table 1. A summary of financial policies

	Interest rate controls	Reserve requirements	Liquidity requirements
Greece	In 1987, interest rate on various deposits and on most categories of short- and long-term loans were deregulated. In 1989, the setting of saving deposit rates were liberalized, but they were still subject to minimum rate established by the Bank of Greece which was abolished in 1993.	Required reserve ratios were quite high until the early 1990s.	In the 1970s and 1980s, banks were required to invest a certain fraction of their total deposits in short-term government bonds. These requirements were reduced in 1990–93 and were abolished in 1993.
Thailand	Ceilings on lending rates liberalized in 1992. Interest rate on deposits completely liberalized in 1990.	Reserve requirements were set low. Variations in the reserve requirement were also low.	In 1991, the Bank of Thailand relaxed the constraint on commercial banks' portfolio management by replacing the reserve requirement ratio with the liquidity ratio.
Philippines	In 1980, ceilings on deposit rates for deposits with maturity >2 years were removed and shorter maturities were subject to ceilings of 14%. In 1981, remaining ceilings on deposit rates were abolished and loan rate ceilings were raised. In 1983, remaining ceilings on short-term loan rates were removed.	Reserve requirements increased significantly in the mid-1980s and again in the early 1990s.	No formal liquidity ratios in place.
Korea	Ceilings on lending rates abolished in 1979. Ceilings on deposit rates liberalized in 1988.	Reductions in reserve requirements in the mid-1990s.	No formal liquidity ratios in place.
India	Ceilings on lending rate imposed in 1963–8 and then reimposed in 1975–87. Ceilings on deposit rate imposed since 1969.	Reserve requirements increased considerably in the mid-1980s and continued to be high in the 1990s.	Liquidity ratios increased significantly in the 1980s and by the 1990s ratios were as high as 38.5%.
Egypt	Ceilings on lending and deposit rates abolished in 1990. Ceilings on lending and deposit rates imposed 1978–90.	Reserve requirements increased significantly in 1978 and remained high up to 1990.	Liquidity ratios was as high as 30% in 1960–90 and decreased significantly afterwards.

Sources: Annual reports of central banks; *IMF Annual Report on Exchange Restrictions* (various issues); Caprio, Atiyas, and Henson (eds) (1994), *Financial Reform*; Cheng, H., (1986), *Financial Policy Reform in Pacific Basin Countries*; Williamson, J. and M. Mahar (1998), *A Survey of Financial Liberalisation*; Lim, J. Y. (1991), *The Philippines Financial Sector in the 1980s*; Bank of Thailand (1994), *Thailand's Financial System: Structure and Liberalisation*; Johnston, B., S. Dorbar, and C. Echeverria (1997), *Sequencing Capital Account Liberalisation: Lessons from the Experiences in Chile, Indonesia, Korea, and Thailand*; Demetriades, P.O. and B. Fattouh (2001), Unproductive credit and the South Korean crisis, CeFiMS, SOAS, Discussion Paper No. 10; Demetriades and Luintel (1997, 2001).

More precisely, we utilize the first principal component which is positively and highly correlated with the underlying variables (this is labelled *PCRLR*). The variable 'Reserve Requirements' is also utilized as a separate variable in those countries where there were no liquidity requirements. Table 2 cites the correlation matrices for all six countries and for all the policy variables utilised over the period of investigation. It is clear from this table that the constructed policy variables, i.e. *IRR* and *PCRLR*, are highly correlated with the underlying variables in each country.

The rest of the variables were constructed as follows. Financial development (*FD*) is measured by the ratio of nominal liquid liabilities to nominal GDP.[3] The data source or this variable is the *Financial Development Database of the World Bank*. Economic development (*GDPK*) is measured by the ratio of real

Table 2. Correlation matrix of policy variables

(a) Correlation matrix of South Korea policy variables

	DRC	*LRC*	*RR*	*IRR*
DRC	1.0000			
LRC	0.8790	1.0000		
RR	0.5095	0.1782	1.0000	
IRR	0.9678	0.9707	0.3508	1.0000

(b) Correlation matrix of the Philippines policy variables

	LRC	*DRC*	*RRDD*	*RRTD*	*IRR*
LRC	1.0000				
DRC	0.8859	1.0000			
RRDD	0.0410	0.00658	1.0000		
RRTD	−0.4116	−0.3257	0.2045	1.0000	
IRR	0.9709	0.9712	0.02448	−0.3795	1.0000

(c) Correlation matrix of policy variables in Thailand

	LRC	*DRC*	*RR*	*IRR*
LRC	1.0000			
DRC	0.8224	1.0000		
RR	−0.6092	−0.5868	1.0000	
IRR	0.9491	0.9597	−0.6257	1.0000

(d) Correlation matrix of policy variables in Greece

	LRC	*DRC*	*RR*	*IRR*
LRC	1.0000			
DRC	0.9790	1.0000		
RR	0.5300	0.6543	1.0000	
IRR	0.9954	0.9940	0.5911	1.0000

(e) Correlation matrix of policy variables in India

	LRC	*DRC*	*LQR*	*RR*	*IRR*	*PCRLR*
LRC	1.0000					
DRC	0.0118	1.0000				
LQR	0.1492	−0.2872	1.0000			
RR	0.0048	−0.3466	0.8357	1.0000		
IRR	0.9387	0.3558	0.0404	−0.1149	1.0000	
PCRLR	−0.03553	−0.4507	0.9372	0.8734	0.8966	1.0000

(f) Correlation Matrix of policy variables in Egypt

	LQR	*DRC*	*LRC*	*RR*	*IRR*	*PCRLR*
LQR	1.0000					
DRC	0.3629	1.0000				
LRC	1.000	0.3629	1.0000			
RR	0.2849	0.9117	0.2849	1.0000		
IRR	0.7813	0.8651	0.7813	0.7640	1.0000	
PCRLR	0.8015	0.7951	0.8015	0.8015	0.9640	1.0000

Variable definition: *DRC* stands for Deposit Rate Controls; *LRC* is Lending Rate Controls; *RR* is Reserve Requirements; *IRR* is Interest Rate Restraints; *RRDD* is Reserve Requirements on Demand Deposits; *RRTD* is Reserve Requirements on Time Deposits; *LQR* is Liquidity Reserve Requirements; *PCRLR* is Principal Component of Reserve and Liquidity Requirements.

GDP to population. The data source for both these variables is *International Financial Statistics* (CD ROM, 1998: 6). The real rate of interest was constructed by taking the difference between the nominal rate of interest (discount rate) and the expected inflation rate (proxied by the current GDP deflator). These variables were also collected from *International Financial Statistics* (CD ROM, 1998: 6). The policy variables are constructed using data from annual reports of central banks.

4. ECONOMETRIC METHODOLOGY

We estimate the following model of financial development:

$$LFD_t = \beta_0 + \beta_1 LGDPK_t + \beta_2 RIRD_t + \beta_3 IRR_t + \beta_4 RLR_t + \varepsilon_t \quad (1)$$

where *LFD* is the logarithm of financial development, *LGDPK* is the logarithm of economic development, *RIRD* is the real interest rate, *IRR* represents interest rate restraints and *RLR* represents reserve requirement and liquidity ratios. *LGDPK* is entered to capture the relationship between financial development and economic activity that emanates from the demand side (and, thus, expected to have a positive sign). *RIRD* should influence financial deepening positively in view of the financial liberalization hypotheses.

Our econometric framework is based on developments in cointegration and the Error Correction Model (ECM). In the first step we use Johansen's (1988) cointegration approach to obtain the long-run cointegrating relationships between the variables of the system. However, the short-run structure of the model is also important in terms of the information it conveys, which is associated with the short-run adjustment behaviour of economic variables. Therefore, in the second step we estimate the short-run VAR in error-correction form with uniquely identified cointegrating vector and obtain a parsimonious version of the statistical model under consideration. Finally, we condition on weakly exogenous variables obtaining a conditional Parsimonious Vector Error Correction Model.[4] Ericsson (1995) shows that in many cases weak exogeneity implies the existence of a conditional ECM, while a structural ECM, in terms of Boswijk (1995), does not exist. In particular, Ericsson argues that a parsimonious conditional ECM can be structural in Hendry's (presentation at the European meeting of the Economic Society, Uppsala, 1993) definition but not structural in Boswijk's sense. In this paper we follow Hendry's definition where structure is a set of basic invariant attributes of the economic mechanism. Thus, the parameters $\theta \in \Theta$ define a structure if they are being invariant over extension of the information set in time, interventions or variables.[5]

To illustrate the modelling of a linear dynamic system we consider a two-equation model where the endogenous variables are Financial Development and GDP per capita. We treat the real interest rate as an exogenous variable, which implies that it can be included in the cointegration space but its marginal distribution does not convey any information for the conditional model. Therefore, real interest rates need not be modelled. Policy variables are used either as exogenous or unrestricted. To be more precise, the treatment of deterministic variables are important for the proper specification of a statistical model and therefore for successful empirical analysis.

Following Hendry and Doornik (1994) we test for the validity of conditioning on the policy dummies, which may proxy endogenous responses by policy makers to exogenous shocks. As a first step we treat policy variables as exogenous and test for their significance in the cointegration space. Even if policy variables are found significant in the long-run impact matrix, we check whether the results are sensible from an economic theory point of view and compare them to those obtained when policy variables enter the system unrestricted.

In summary our econometric methodology includes the following three steps:

(1) We write (1) in a VAR form:

$$x_t = \sum_{j=1}^{p} \Phi_j x_{t-j} + \Psi D_t + \varepsilon_t \quad (2)$$

where $x_t' = [LFD_t, LGDPK_t]$ and D_t includes the policy variables. We apply the Johansen cointegration technique to estimate the number of cointegrating vectors. We identify the unique cointegrating vectors which are one in all countries with the exception of India (see Section 5 below for the relevant details). Therefore, there is no need to identify the cointegrating vector by imposing restrictions on the cointegrating space (again except for India).

(2) In the second stage we estimate an ECM and therefore we reparameterize the Gaussian VAR as follows:

$$\Delta x_t = \alpha\beta' x_{t-1} + \sum_{j=1}^{p-1} \Phi_j x_{t-j} + \Psi D_t + \varepsilon_t \tag{3}$$

for the $(n \times r)$ matrix of the cointegrating vector β and $(n \times r)$ weighting α. Model (3) is a reduced form and consequently there are simultaneity effects between the endogenous variables of the system, i.e. Financial Development and GDP per capita. However, the significance of the elements of matrix α indicates whether the variables under consideration react to the equilibrium error. The variable that is not affected by the error-correction term is weakly exogenous with respect to the cointegrating vector and we have to proceed by estimating model (3) without taking into account the distribution of that exogenous variable. In particular, we can partition x_t as $(y_t' : x_t')$ in which case model (3) may be rewritten as a conditional model for y_t, given x_t:

$$\Delta y_t = B * \Delta z_t + \alpha_c \beta' x_{t-1} + \sum_{j=1}^{p-1} \Phi_{1j} * x_{t-j} + \Psi * D_t + v_t \quad v_t \sim NI(0, \Sigma_v) \tag{4}$$

and the marginal model for z as:

$$\Delta z_t = \alpha_2 \beta' x_{t-1} + \sum_{j=1}^{p-1} \Phi_{2j} * x_{t-j} + \Psi_2 D_t + \varepsilon_{2t} \quad \varepsilon_{2t} \sim NI(0, \Sigma_{22}) \tag{5}$$

where $B^* = \Sigma_{12}\Sigma_{22}^{-1}$, $\alpha_c = \alpha_1 - B^* \alpha_2$, $\Phi_{1j}^* = \Phi_{1j} - B^* \Phi_{2j}$, $\Psi^* = \Psi_{1t}^* - B^* \Psi_{2t}^*$, $v_t = \varepsilon_{1t} - B^* \varepsilon_{2t}$, $\Sigma_v = \Sigma_{11} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}$, where α_1 denotes the speed of adjustment of y_t with respect to the equilibrium error; matrices are partitioned conformably with $(y_t' : x_t')$, and subscripts indicate the relevant sub-matrix. Johansen (1995) shows that if $\alpha_2 = 0$ then z_t is weakly exogenous for parameters (β, α_1) and the maximum likelihood estimator of β and α_1 can be calculated from the conditional model.

(3) In the final stage we estimate model (3) conditional on exogenous variables, i.e.:

$$\Delta \bar{x} = Bz_t + \alpha\beta' x_{t-1} + \sum_{j=1}^{p-1} \Phi_j x_{t-j} + \Psi D_t + \varepsilon_t \tag{6}$$

where $\bar{x}$ is the same as x excluding the exogenous variables z_t; equation (6) is actually equivalent to (4). Boswijk (1995) proposed the notion of a structural ECM which is a representation of a conditional ECM that satisfies certain restrictions. Ericsson (1995) shows that violation of this restriction can lead to a conditional ECM which may be structural in a sense other than Boswijk's.[6] In our case where we have two endogenous variables, exogeneity of one of them implies a structural ECM that also satisfies Boswijk's restrictions.

5. EMPIRICAL RESULTS

We began by examining the degree of integration of each variable, which was found to be **I**(1) in all cases, except for the policy variables which are dummies.[7] We then proceeded to conduct Johansen's cointegration analysis. The results of the latter exercise suggest the existence of one cointegrating vector in five of the six countries included in the sample. The exception is India, where we found two cointegrating vectors. We, thus, imposed two restrictions in this case, in addition to those on normalization in order to exactly identify the cointegrating vectors. In all six cases we normalize the equation according to financial development allowing us to interpret the cointegrating vector as a financial development equation. All the results reported in Tables 3(a) and 4 and discussed in this section, for both the unrestricted VAR and the ECM relationships, do not suffer from (single-equation or vector) autocorrelation, heteroscedasticity and non-normality, as suggested by the relevant statistics and diagnostics reported in Table 3(b). There are two

Table 3(a). Normalized Cointegrating Vectors

Country	Variables				
South Korea	*LFD*	*LGDPK*	Trend	*RIRD*	
	1.0000**	−0.5779**	−0.0137**	0.0096	
The Philippines	*LFD*	*LGDPK*	Trend	*RIRD*	IRR
	1.0000*	−0.6338	−0.006**	−0.0134**	1.032 **
Thailand	*LFD*	*LGDPK*	Trend		
	1.0000*	−1.041**	−0.0103		
Greece	*LFD*	*LGDPK*	*RIRD*		
	1.0000*	−0.3602*	−0.0244**		
India	*LFD*	*LGDPK*	*RIRD*	*PCRLR*	
	1.0000*	−0.0503**	−0.0011**	−0.0599**	
Egypt	*LFD*	*LGDPK*	*RIRD*	*IRR*	PCRLR
	1.0000**	−1.264**	−0.0030	−0.3683	0.1118*

Notes: **significance at the 1% level; *significance at the 5% level.

Table 3(b). Diagnostic test for the unrestricted VAR estimation

Tests	South Korea	The Philippines	Thailand	Greece	India	Egypt
GDP_{AUT}	1.546 [0.239]	1.737 [0.198]	4.016 [0.041]	0.290 [0.751]	0.578 [0.570]	1.309 [0.292]
LFD_{AUT}	1.083 [0.302]	0.205 [0.815]	3.215 [0.070]	1.908 [0.178]	0.668 [0.524]	1.646 [0.217]
GDP_{ARCH}	0.089 [0.770]	0.658 [0.425]	0.115 [0.738]	0.454 [0.509]	2.151 [0.158]	0.020 [0.886]
LFD_{ARCH}	0.005 [0.940]	0.0005 [0.98]	0.697 [0.417]	9.109 [0.007]	0.178 [0.677]	2.865 [0.106]
GDP_{NORM}	1.082 [0.582]	1.985 [0.370]	1.592 [0.451]	1.200 [0.548]	0.808 [0.667]	0.381 [0.826]
LFD_{NORM}	0.184 [0.911]	2.375 [0.304]	3.888 [0.143]	1.352 [0.508]	1.579 [0.453]	0.005 [0.997]
GDP_{HET}	—	0.363 [0.955]	—	0.359 [0.931]	0.461 [0.890]	0.048 [0.999]
LFD_{HET}	—	0.217 [0.994]	—	0.952 [0.583]	0.503 [0.864]	0.071 [0.998]
VAR_{AUT}	1.483 [0.248]	0.658 [0.724]	1.994 [0.095]	0.895 [0.533]	2.309 [0.073]	1.983 [0.079]
VAR_{NORM}	0.963 [0.915]	3.759 [0.439]	10.21 [0.038]	4.459 [0.347]	1.272 [0.866]	1.516 [0.823]
VAR_{HET}	—	0.192 [1.000]	—	0.291 [0.992]	0.309 [0.997]	59.08 [0.509]

Notes: (1) The following tests are for for the equations of GDP and Financial Development: GDP_{AUT} and LFD_{AUT} denote the autocorrelation tests; GDP_{ARCH} and LFD_{ARCH} denote the tests for ARCH effects; LFD_{NORM} and LFD_{NORM} denote normality tests; GDP_{HET} and LFD_{HET} denote tests for heteroscedastisity; VAR_{AUT}, VAR_{NORM} and VAR_{HET} denote tests for autocorrelation, normality and heteroscadasticity respectively in the unrestricted VAR model. (2) The numbers in the square brackets show the *p*-values of the null hypotheses that residuals are uncorrelated, homoscedastic and normally distributed. (3) We have used the relevant *F* and χ^2 tests both for the individual equations and for the VAR.

exceptions to this. The first is in the case of Thailand, where the tests for autocorrelation in the GDP equation and for vector non-normality are only marginally accepted at the 5% level. The second is related to Greece, where in the Financial Development equation there is evidence of significant ARCH effects. However, Cheung and Lai (1993) show that when the residuals in the VAR follow a moving-average process then the relevant AIC may be unreliable. Under these circumstances one can only specify the VAR system on the basis of the uncorrelated VAR residuals; in our case the VAR residuals are indeed uncorrelated (see Table 3(b)).

Table 3(a) reports the normalized cointegrating vectors with respect to financial development. On the whole, the estimated coefficients are reasonable in terms of both size and sign. GDP per capita enters with the expected positive coefficient in all countries indicating that a higher level of economic development is associated with higher level of financial development. The real interest rate enters with a positive coefficient, with the exception of South Korea where the coefficient is negative and insignificant, and Thailand where data on this variable are unavailable.

As to the impact of financial policies, we obtain some very interesting results. In the Philippines, India and Egypt, the financial policy variables enter in the cointegrating vector, indicating that these policies have long-run effects on financial development. Specifically, in the case of the Philippines interest rate restraints

Table 4. Parsimonious conditional ECM

(a) Parsimonious conditional ECM for South Korea

DLFD	*DLGDPK*	*DLGDPK*(1)	*DLGDPK*(2)	*DLFD*(1)	*DLFD*(2)	*CI*(1)	*IRR*	*RR*
Coefficient	−0.6739	0.6720	−0.9106	0.4144	−0.7612	−0.1105	−0.0957	−0.0016
Std error	0.1242	0.1329	0.1318	0.1027	0.1162	0.0427	0.0169	0.0010
t-prob	0.0001	0.0001	0.0000	0.0011	0.0000	0.0206	0.0000	0.1375

(b) Parsimonious conditional ECM for the Philippines

DLFD	*DLGDPK*	*DLGDPK*(1)	*DLGDPK*(2)	*DLFD*(1)	*CI*(1)
Coefficient	0.3450	0.0627	0.3704	0.4809	−0.0465
Std error	0.2713	0.3248	0.3065	0.1492	0.0208
t-prob	0.2136	0.8482	0.2326	0.0031	0.0338

(c) Parsimonious conditional ECM for Thailand

DLFD	*DLFD*(1)	*CI*(1)	*DLGDPK*	*RR*
Coefficient	0.3300	−0.1236	−0.8627	−0.0647
Std error	0.1522	0.0403	0.2228	0.0264
t-prob	0.0408	0.0054	0.0008	0.0226

(d) Parsimonious conditional ECM for Greece

DLFD	*DLGDPK*	*DLGDPK* (1)	*GLFD*(1)	*DLFD*(2)	*CI*(1)	*IRR*(1)
Coefficient	−0.3041	−0.3678	−0.4075	−0.3937	−0.1579	0.1841
Std error	0.3077	0.3070	0.1659	0.1537	0.0586	0.0291
t-prob	0.3324	0.2422	0.0214	0.0169	0.0124	0.0000

(e) Parsimonious conditional ECM for India

DLFD	*DLGDPK*(1)	*DLFD*(1)	*CI*(1)	*IRR*(1)
Coefficient	0.1036	0.4062	−0.0811	0.0107
Std error	0.0454	0.1519	0.0547	0.0058
t-prob	0.0304	0.0124	0.1464	0.0800

(f) Parsimonious conditional ECM for Egypt

DLFD	*DLGDPK*	*DLGDPK*(1)	*DLGDPK*(2)	*DLFD*(1)	*DLFD*(2)	*CI*(1)
Coefficient	−0.5095	0.7060	−0.7555	0.8187	−0.3457	−0.3078
Std error	0.1594	0.2255	0.2319	0.1466	0.1421	0.0829
t-prob	0.0034	0.0041	0.0029	0.0000	0.0214	0.0009

have a negative and significant influence, while in all the other countries the effect is insignificant (in Egypt it appears with a positive and insignificant coefficient; excluding it affects adversely the other variables included in the cointegrating vector). The Reserve and Liquidity Requirements variable enters negatively in the cointegrating vector for Egypt, and is significant at the 5% level. In the case of India it enters significantly (at the 1% level) with a positive coefficient. In contrast, financial policies do not have a significant long-run effect on financial development in South Korea, Thailand and Greece.

These results indicate that institutional factors, which vary considerably across our sample of countries, may be playing a critical role in determining how financial policies affect the process of financial development. Importantly, financial restraints sometimes appear to have positive long-run effects, suggesting that more complex factors may be at work in the financial deepening process than was thought by the traditional literature on financial liberalization. As explained in Section 2, recent theoretical models predict that financial restraints may play a prudential role, limiting moral hazard behaviour by banks, in which case the relevant coefficient may be expected to be positive. In practice, this may reflect increased confidence in the banking system, which may produce a rightward *shift* in the financial saving function. This effect is over and above the effect of the real interest rate, which should be interpreted as a *movement along* the same function. This rightward shift in the financial saving function may reflect responses to financial policies through changes in the degree of active liability management by banks, which may take the form of non-price activities such as varying the number of branches and the intensity of marketing activity.

In the second stage and in the case of five countries, GDP per capita does not react to an error-correction specification. Consequently, this variable is weakly exogenous to the cointegrating vector. As suggested above (Section 4), under these circumstances we can proceed with the estimation of the financial development variable as a parsimonious ECM conditional on GDP per capita being exogenous. Table 4 contains the results of the parsimonious ECM specification of the financial development equation. The short-run effects of financial restraints are mixed. In South Korea, interest rate restraints exert a negative short-run effect on financial development, whereas in Greece and India their effect is found to be positive and significant. In the Philippines, Thailand and Egypt interest rate restraints are not found to have a significant impact on financial development in the short run.

As to reserve and liquidity requirements, their short-run impact on financial development also varies across countries. Reserve requirements enter with a negative sign, but with varying degrees of significance, in South Korea and Thailand. On the other hand, reserve and liquidity requirements do not seem to have a short-run impact on financial development in the Philippines, Greece, India and Egypt. These mixed results reflect the ambiguity at the theoretical level of the impact of reserve and liquidity requirements on financial depth, as discussed in Section 2.

6. SUMMARY AND CONCLUSIONS

This paper provides a novel assessment of the effects of several types of financial policies on financial development in six countries. Specifically, it uses a new data set on interest rate restraints and reserve and liquidity requirements for a period of forty years, the collection of which represented a major research effort. It utilizes modern time series methods to examine the effects of financial policies on financial development, controlling for the level of economic development.

Our empirical findings demonstrate that the real interest rate has a positive and significant long-run effect on financial development in four out of the six countries examined and no significant effect in the other two cases (but positive in one of them). However, our findings demonstrate, as Max Fry suspected, that financial policies have *additional direct* significant long- and short-run effects. These direct effects vary considerably across countries, and we believe that this variation may reflect institutional differences, such as the quality of prudential supervision. Interestingly, we find that while financial restraints in some cases have negative direct effects, there are also cases where their effects are positive. Thus, our empirical findings demonstrate that the main predictions of the financial liberalization literature do not receive full empirical support, a result which is consistent with the prevalence of financial market imperfections.

Several fruitful avenues for further research emerge from our findings. One plausible conjecture is that financial restraints have positive effects on financial development where institutional quality, such as prudential regulation and supervision, is weak. To test this conjecture one would require data on the quality of the regulatory regime, a challenging but worthwhile endeavour. Other institutional quality indicators, such as the quality of legal rules and law enforcement, have been used successfully in relation to the development of capital markets (e.g. La Porta et al., 1997). Additionally, as Max Fry (1995, 1998) also indicated, there are under-researched theoretical aspects to be explored with respect to the relationship between financial liberalization and financial regulation, including the interactions between prudential and monetary control. Consequently, further work on these, and related issues, is likely to produce useful insights into the effectiveness of financial liberalization in developing economies.

ACKNOWLEDGEMENTS

We benefited greatly from comments by the participants to the Maxwell Fry Memorial Conference at the Bank of England, 11 May 2001, and by the referees' comments; we are grateful to all of them. The usual disclaimer applies.

NOTES

1. Early criticism of the financial liberalization thesis emphasized structural considerations, such as unofficial credit markets. These may reverse the conclusions of financial liberalization if increases in interest rates in the official markets, following the removal of controls, crowd out loans in the unofficial markets (Taylor, 1983; Van Wijnebergen, 1983).
2. A related point is that interest rate restrictions generate scope for rationing credit in accordance to national priorities through directed credit programmes. While in many countries directed credit programmes failed to achieve efficiency gains, some governments have been successful in channelling credit towards projects with high social returns, which may have been unprofitable to finance with the higher interest rates that usually prevail in liberalized credit markets (Calomiris and Himmelberg, 1994). For example, in some East Asian countries the willingness to adapt credit policies to changing circumstances and the use of contests based on export performance to guide directed credit programmes are believed to have contributed significantly to the effectiveness of these programmes (World Bank, 1993).
3. Liquid liabilities are defined as currency held outside the banking system plus demand and interest-bearing liabilities of the banks and non-bank financial intermediaries.
4. In particular, we have only two endogenous variables and we normalize with respect to one of them, which is consistent with the purpose of this paper.
5. Θ is the parameter space of the structural model (i.e a model defined by the economic theory). For a detailed analysis of structural and statistical models see Spanos (1989, 1990).
6. Premultiplying (4) by a non-sigular matrix A, the structural model can be obtained.
7. The results of the integration tests are available from the authors upon request.

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