Financial Liberalization Or Repression?

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Abstract

While financial liberalization has always been advocated in developing countries, experiences with it do not always produce desirable outcomes. In order to evaluate the costs and benefits associated with financial liberalization and repression, this study highlights that the overall effectiveness of the reform programs depends on the relative strength of each financial sector policy implemented. Using India as a case study, the results indicate that interest rate controls, statutory liquidity requirements and directed credit programs positively affect the level of financial development. A rise in cash reserve requirements appears to have an adverse effect on development of the financial system. The results lend some support to the argument that some form of financial restraints may help promote financial development.

Key words: Financial development; financial liberalization
JEL classification: E44; E58; O16; O53

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1. Introduction

The financial liberalization thesis of McKinnon (1973) and Shaw (1973) has had a far-reaching influence on the policy prescriptions adopted by many developing countries during the 1970s and 1980s, which tended to encourage more financial saving by increasing real interest rates. This was motivated by the argument that financial repression policies were regarded to be largely accountable for the poor economic performance of developing countries in the 1960s, where low saving and credit rationing were widely observed. Investment suffered both in terms of quantity and quality as funds were allocated at the discretion of policy makers. McKinnon (1973) and Shaw (1973) challenged the financial repression ideology and provided a new paradigm in the design of financial sector policies. Their theories proposed that distortions in the financial systems, such as loans issued at an artificially low interest rate, directed credit programs, and high reserve requirements would reduce saving, retard capital accumulation, and prevent efficient resource allocation. The elimination of these distortions would significantly deepen financial systems and therefore stimulate economic growth.

Experiences with financial liberalization, however, do not always produce desirable results. As noted by Demirguc-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999), financial liberalization seems to be systematically related to banking fragility, which dampens financial sector development. This apparent controversy prompts us to take a different perspective at the subject. A more satisfactory approach to assessing the effect of financial sector reforms should explicitly account for each component of the reform program. This would provide a more complete analysis of the costs and benefits associated with financial repression and liberalization. Thus, the overall effectiveness of the entire reform program would depend on the relative strength of each type of financial sector policy implemented. Analysis performed at the disaggregated level also helps identify an appropriate mix of financial liberalization and repressionist policies which is effective in deepening the financial systems.

The literature so far has only focused on either examining the role of finance on growth or establishing the causal link between them. Although much progress has been made, little attention has been paid to understanding what shapes financial development with particular reference to the role of financial policy. Results merely based on causality tests or cross-country growth regressions provide little guidance to draw any useful policy lessons from the available literature. The lack of attention afforded to understanding the role of financial policy in the process of financial deepening may have therefore contributed to the lack of success of this strand of literature in influencing the formulation of financial sector policies. As emphasized by Ang (2008a), understanding how each type of financial sector policy affects financial development has important policy implications. In particular, the role of the central bank in stabilizing the financial systems has recently been of

considerable interest to academic researchers and policy makers in the aftermath of the recent global financial turbulence. While this paper does not directly address the implications of the global financial crisis, it is hoped that the analysis will provide policy makers with some direction in formulating appropriate financial sector policies.

The above considerations also highlight that the "one size for all" argument, based on the results obtained from cross-country regressions, cannot be rigidly applied given that each country has its own unique institutional setting and financial sector history (see Rioja and Valev, 2004a). As a result, we focus our analysis on a case study rather than a larger sample of country. India provides an ideal testing ground for the analysis given its rich history in financial sector reforms. There was little financial repression in the financial system of India prior to the 1960s. However, the Reserve Bank of India gradually imposed more controls over the financial system by introducing interest rate controls in the 1960s. The statutory liquidity ratio was raised from 25% in 1966 to 38% in 1989, and the cash reserve rate increased considerably from 3% to 15% during the same period. These requirements enabled the Reserve Bank to purchase government securities at low cost. The extent of directed credit programs has also increased markedly since the nationalization of the 14 largest private banks in 1969. A number of priority lending rates were set at levels well below those that would prevail in the free market. This process culminated in the late 1980s when directed lending was more than 40% of the total.

The major phase of financial liberalization was undertaken in 1991 as part of the broader economic reform in response to the balance of payments crisis of 1990-91. The objective was to redirect the entire orientation of India's financial development strategy from its position as a financially repressed system to that of a more open system so as to provide a greater role for markets in price determination and resource allocation. Consequently, interest rates were gradually liberalized and reserve and liquidity ratios were significantly reduced. However, despite liberalizing the financial sector since the early 1990s, the Indian financial system has continued to operate within the context of repressionist policies, particularly through the provision of subsidized credit to certain priority sectors. Hence, it appears that repressionist measures coexist with a set of liberalized policies of promoting free allocation of resources. But it is not clear how each of these policies would affect development of the financial system.

The issue financial liberalization in India has been well studied in the literature. Among others, Sen and Vaidya (1999) provide a detailed examination of the process of financial liberalization, focusing on its link with the regulatory regime, real sector reforms, the general macroeconomic environment and the conduct of monetary policy. Emran *et al.* (2007) assess the effects of financial liberalization on the price responsiveness of private investment. Their results indicate that private investment has become more sensitive to a change in the cost of capital after

liberalization. The dynamic relationship between finance and inequality in India is recently examined by Ang (2009a), who shows that while financial development helps reduce income inequality, financial liberalization seems to exacerbate it. Moreover, Ang (2009b) assesses how financial sector policy influences private investment in India. The results indicate that directed credit programs, interest rate controls, and reserve and liquidity requirements have mixed effects on private investment.

While the above studies have contributed to the understanding of the effects of financial liberalization on macroeconomic performance in India, so far no study has focused on how each type of financial sector policies affects development of the Indian financial system. This study addresses the important question of how government intervention in the financial system, including cash reserve requirements, directed credit programs, statutory liquidity requirements and interest rate controls, affects development in the financial system using India as a case study. It is hoped that the results of this study can be used to inform analytical and policy debate in India, as well as other developing countries. The remainder of this paper is organized as follows. Section 2 discusses some conceptual issues. Model specification and data are described in Section 3. Sections 4 and 5 present the estimation techniques and results, and the last section concludes.

2. Conceptual Issues

The McKinnon-Shaw school of thought proposes that government restrictions on the operation of the financial systems, such as interest rate ceilings, directed credit programs, reserve and liquidity requirements (dubbed "financial repression"), may inversely affect the quality and quantity of investment and thus hinder financial development. Their analytical framework focuses on interest rate controls, particularly interest rate ceilings, which may distort the economy in several ways. First, it may discourage entrepreneurs from investing in high risk but potentially high-yielding investment projects. Second, financial intermediaries may become more risk averse and offer preferential lending to established borrowers. Third, borrowers who obtain their funds at relatively low cost may prefer to invest only in capital intensive projects. Hence, they argue in favor of liberalizing the financial sectors by way of removing interest rate controls and allowing the market to determine its own credit allocation in order to deepen the financial system.

However, some counter arguments suggest that financial liberalization may not necessarily lead to higher financial development. For instance, the neostructuralist contributions of van Wijnbergen (1982) and Taylor (1983) suggest that the impact of lower taxation on financial systems may reduce the flow of credit to the private sector, thereby discouraging financial intermediating activity. Since the formal financial systems are subject to reserve requirements, which involve a leakage in the intermediation process, the neostructuralists argue that curb (unorganized) markets

perform more efficiently in intermediating savers and investors. A rise in bank deposit rates following financial liberalization induces households to substitute curb market loans for bank deposits, resulting in a fall in the supply of loanable funds. Thus, in the presence of efficient curb markets, removing interest rate restraints tends to discourage lending to the private sector, thereby retarding financial development.

Stiglitz (1994) also argues that interest rate restraints may lead to higher financial saving when good governance is present in financial systems. When depositors perceive restrictions as policies aimed at enhancing the stability of the financial system, they may well be more willing to keep their savings in the form of bank deposits, thereby increasing the depth of the financial system. Hellmann *et al.* (1996) show that in a competitive equilibrium, banks have no incentive to attract new customers and deepen market penetration since their profit margin on deposits is zero due to intense competition. However, if the government imposed a deposit rate ceiling, banks can make positive returns and therefore have an incentive to attract more depositors, as long as the market is not fully penetrated. This reasoning suggests that deposit rate controls can induce banks to spend more resources on deepening the financial system.

In the case of reserve requirements, Courakis (1984) shows that under the condition where the demand for loanable funds is not perfectly inelastic, higher reserve requirements may increase the profit-maximization deposit rate and hence the volume of loanable funds. Using a general equilibrium model, Bencivenga and Smith (1992) show that the optimal degree of financial repression depends on the size of government deficits. In the presence of large government deficits, it will be desirable to impose higher reserve requirements. Their model also implies that financial liberalization will not increase financial intermediating activity, since savings in the formal sector translate into lower investment compared to savings in the informal sector, due to the absence of reserve requirements.

However, in the model developed by Giorgio (1999), the optimal level of reserve requirements is inversely related to the extent of financial intermediation since financial innovation makes reserve requirements less effective by creating new instruments which are close substitutes for assets subject to these mandatory requirements. Kim and Santomero (1988) and Gennotte and Pyle (1991) also show that capital requirements increase a bank's portfolio risk and hence may result in an inefficient allocation of resources. This is arguably the case when the funds related to these repressionist programs are not allocated efficiently to generate productive returns.

The implementation of directed credit programs generally involves the administered allocation of loans to priority sectors, in India's case mainly agriculture and small-scale industry. Without such interventions, banks generally will not fund those activities with low returns. Although the McKinnon-Shaw thesis advocates the removal of directed credit programs since they

displace investment projects with potentially higher returns, Stiglitz and Weiss (1981) show that financial liberalization is unlikely to result in allocative efficiency. This is because under asymmetric information, banks will practice credit rationing and be reluctant to raise interest rates in response to higher demand for loans, due to adverse selection problems. According to Schwarz (1992), directed credit programs may lead to increased financial intermediation in the targeted sectors. If more funds are allocated to the high-return sector, an economy-wide increase in financial intermediating activity will be expected. However, the allocation of funds involving the government in developing countries may be subject to the risk of biased assessments and corruption, and often results in sub-optimal outcomes (Emran and Stiglitz, 2009). Given the above, it appears that the impact of each of these financial sector policies on financial development is theoretically ambiguous. It is therefore ultimately an empirical issue.

3. Model Specification and Data

The empirical specification of the financial development (FD_t) equation in Eq. (1) considers how each type of financial repressionist policies, including interest rate restraints (IRR_t), cash reserve ratio (CRR_t), statutory liquidity ratio (SLR_t) and directed credit program (DCP_t), impacts on development of the Indian financial system.[1] The expected signs for $\chi's$ cannot be determined *a priori* since the impacts of each type of financial sector policies on financial development is theoretically ambiguous. The specification includes an income variable given that expansion of the financial system may be induced by higher per capita income due to increased demand for financial services (Robinson, 1952). We include a measure for macroeconomic uncertainty ($VCPI_t$) in view that financial development may be affected by the level of uncertainty in the economy. Finally, the specification also includes a dummy variable to capture the effect of the balance of payment crisis in 1991. Annual data covering the period 1950-2005 are used in the empirical analysis. The data series are directly obtained or compiled from Annual Report and Report on Currency and Finance of the Reserve Bank of India and National Accounts Statistics of the Central Statistical Organisation in India.

$$FD_t = \alpha + \beta ED_t + \chi_1 IRR_t + \chi_2 CRR_t + \chi_3 SLR_t + \chi_4 DCP_t + \delta VCPI_t + \varepsilon_t \qquad (1)$$

Obtaining a precise indicator of financial development is a difficult task, as highlighted by Levine (2005) and Ang (2008b). In this study, we follow the standard approach used in the

[1] The consideration of these four repressionist measures in the same specification is unlikely to give rise to any problems of multicollinearity in this case given that they do not have a high correlation structure (average of only 0.67).

literature by taking the ratio of private credit to GDP as the measure of financial development (PCY_t) (see, e.g., King and Levine, 1993; Levine *et al.*, 2000; Rioja and Valev, 2004a, b; Clarke *et al.*, 2006; Mavrotas and Son, 2006). This ratio increased significantly from only about 5 percent in 1950 to 28 percent in 1990, and 45 percent in 2005. As a sensitivity check, we also consider two other financial development indicators, namely credit to the commercial sector as a share of GDP (CCY_t) and the ratio of M3 minus M1 to GDP (MMY_t). The former indicator excludes bank credit extended to the household sector. This measure does not include credit obtained for financing house purchase, which does not contribute to financial deepening. However, it also excludes credit raised to finance small-scale business initiated by households, which constitutes an important part financial intermediation. In the latter, subtracting narrow money from broad money allows us to focus on the intermediation activities provided by the banking system (see, e.g., Rousseau and Wachtel, 2002). By doing so, the measure better reflects the extent of financial intermediation, which is in line with the debt intermediation hypothesis of Gurley and Shaw (1955) and Shaw (1973).

Economic development (ED_t) is measured by per capita gross domestic product at 1993 prices. Uncertainty ($VCPI_t$) is measured by taking three-year moving average deviation of the change in inflation between period t and t-1, where the rate of inflation is constructed using consumer price index. FD_t, ED_t and $VCPI_t$ are measured in natural logarithms. The policy variables statutory liquidity ratio (SLR_t) and cash reserve ratio (CRR_t) are measured in percentages. The extent of directed credit programs (DCP_t) is measured by 0, 1, 2 and 3 when the programs cover zero percent, up to 20 percent, 21-40 percent, and more than 40 percent, respectively, of total bank credit (see Ang, 2009a, b). While the extent of these programs was negligible in the 1950s, the government progressively imposed more controls over the next there decades, providing subsidized credit to certain priority sectors such as agriculture and small-scale manufacturing. Significant directed credit controls remain in force to-date.

A summary measure of interest rate restraints (IRR_t) is constructed using the method of principal component analysis to represent the joint impact of the various interest rate controls imposed on the financial system in India. The construction of the index involves six interest rate controls: a fixed deposit rate (FDR_t), a deposit rate ceiling (DRC_t), a deposit rate floor (DRF_t), a fixed lending rate (FLR_t), a lending rate ceiling (LRC_t), and a lending rate floor (LRF_t). These policy controls are translated into dummy variables which take the value of 1 if a control is present and 0 otherwise.

Table 1: Principal component analysis for the index of interest rate restraints

	Principal component					
	1	2	3	4	5	6
Eigenvalues	2.370	1.722	1.010	0.489	0.266	0.143
% of variance	0.395	0.287	0.168	0.081	0.044	0.024
Cumulative %	0.395	0.682	0.850	0.932	0.976	1.000
	Eigenvector					
	1	2	3	4	5	6
FDR_t	-0.552	0.262	0.281	0.034	0.060	-0.737
DRC_t	-0.544	-0.173	-0.267	0.344	0.623	0.311
DRF_t	-0.416	-0.477	0.172	0.301	-0.672	0.167
FLR_t	-0.176	0.287	-0.860	-0.034	-0.362	-0.124
LRC_t	-0.151	-0.617	-0.169	-0.719	0.118	-0.194
LRF_t	-0.415	0.459	0.230	-0.522	-0.112	0.529

Notes: FDR_t = fixed deposit dummy, DRC_t = deposit rate ceiling dummy, DRF_t = deposit rate floor dummy, FLR_t = fixed lending dummy, LRC_t = lending rate ceiling, and LRF_t = lending rate floor.

Table 1 presents the results for the index of interest rate restraints obtained from principal component analysis. The eigenvalues indicate that the first principal component explains about 39.5 percent of the standardized variance, the second principal component explains another 28.7 percent and so on. The first principal component is computed as a linear combination of the six policy measures with weights given by the first eigenvector. In this case, the four largest principal components are extracted, and they are able to capture 93.2 percent of the information from the original data set. The remaining principal components are not considered since their marginal information content is relatively small. The percentages of variance are adjusted to make sure that their absolute values sum up to one. These adjusted values are then used as the weights to compute the index. In this connection, the first principal component, which accounts for 39.5 percent of the total variation of the policy variables, has a weight of 39.5/93.2, and so on.

The resulting index is presented in Figure 1. As is evident, the financial system in India appears quite liberalized in the 1950s since there was no interest rate controls imposed during that period. The first interest rate control was introduced in 1963 when a maximum lending rate was imposed. Since then, the index shows an upward trend and reaches a peak during the period 1975-1980. The index begins to move downwards in the early 1980s, following the introduction of some liberalization measures, before bouncing back again in 1987. 1988 saw another peak in the index, coinciding with the implementation of various interest rate controls. A major reform in interest rate policy occurred in early 1990s when the Reserve Bank allowed banks to determine their own interest rates. In recent years, the extent of interest rate restraint was further moderated to the level in late 1960s, and has remained fairly stable since then.

Figure 1: Index of interest rate restraints (IRR_t)

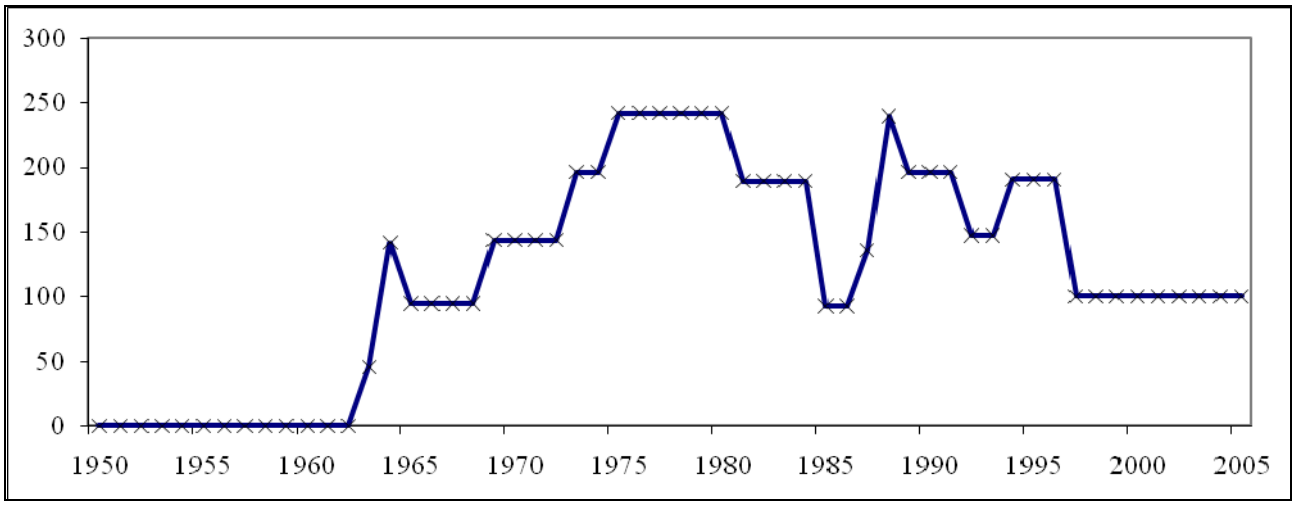
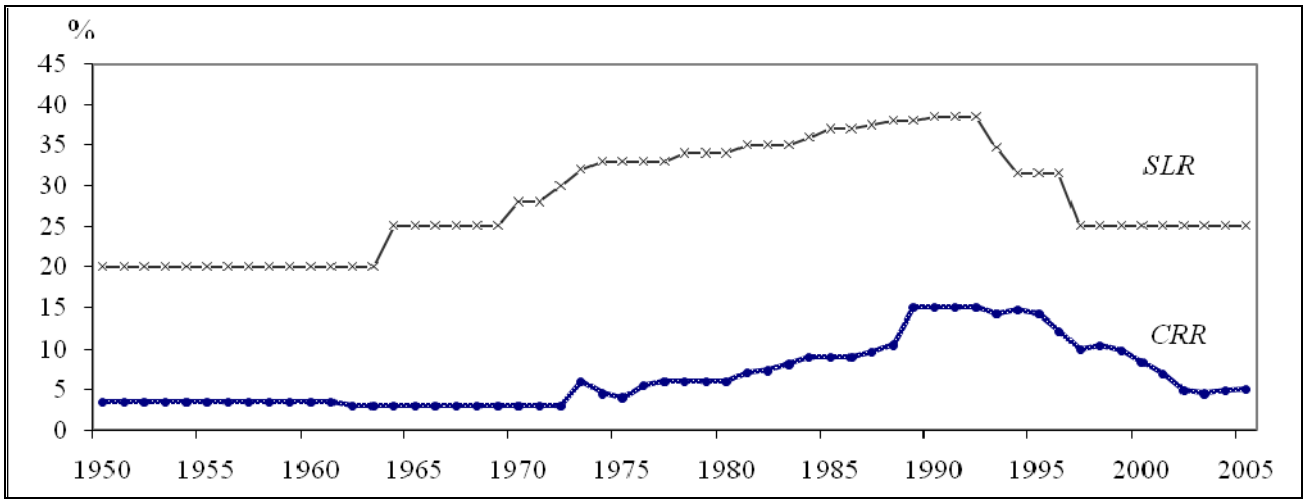


Figure 2 shows how cash reserve ratio (CRR_t) and statutory reserve requirement (SLR_t) evolve over time. The former requires banks to hold part of their deposits in the form of cash balances at the Reserve Bank of India, while the latter imposes a requirement for banks to keep a share of their asset in government securities at below-market interest rates. Historically, CRR_t has been kept low in the range of 3-3.5 percent during the 1950s and 1960s. The ratio was gradually raised to 15 percent in 1990 to increase cash balances. Similarly, SLR_t was raised from 20 percent in 1950 to 38.5 percent in 1990, which helped the government to obtain cheap finance. Both requirements have fallen significantly following the liberalization initiated in 1991. Currently, the CRR_t and SLR_t stand at 5 and 25 percent of bank deposits, respectively.

Figure 2: Cash reserve ratio (CRR_t) and statutory liquidity requirement (SLR_t)



4. Estimation Techniques

The objective of our empirical estimation is to examine the long-run relationship between financial development and its determinants. We begin the analysis by maintaining the assumption that the data generating process for the relationship between the underlying variables is a vector autoregressive (VAR) model at levels. The testing procedure involves three steps. First, we perform an integration analysis for each variable using the conventional unit root tests. The second step is to test for cointegration using the Johansen approach for the VARs constructed in levels. If cointegration is detected, the third step is to estimate the long-run relationship. The VAR model is given as:

$$\boldsymbol{x}_t = \boldsymbol{\mu} + \sum_{j=1}^{p} \boldsymbol{\phi}_j \boldsymbol{x}_{t-j} + \boldsymbol{\varepsilon}_t \tag{2}$$

where x_t is a column vector of the underlying variables, $\boldsymbol{\mu}$ is a vector of constant terms and $\boldsymbol{\phi}_j$ is a matrix of VAR parameters for lag *j*. The vector of error term $\boldsymbol{\varepsilon}_t \sim \text{IN}(\mathbf{0}, \boldsymbol{\Omega})$, where $\boldsymbol{\Omega}$ is the variance-covariance matrix of the residuals. The VAR model in Eq. (2) can be transformed into a vector error correction model (VECM) after some mathematical manipulation, as given in Eq. (3).

$$\Delta \boldsymbol{x}_t = \boldsymbol{\mu} + \pi \boldsymbol{x}_{t-1} + \lambda \sum_{j=1}^{p-1} \boldsymbol{\gamma}_j \Delta \boldsymbol{x}_{t-j} + \boldsymbol{\varepsilon}_t \tag{3}$$

where the rank of π is equal to the number of cointegrating vectors. The cointegration test draws upon the procedure of Johansen (1988), which can be performed using the VECM formulated in Eq. (3). By normalizing FD_t, the cointegrating vector can be interpreted as the long-run equation for the financial development equation.

Since the small sample properties of VECM are unknown (see, e.g., Bewley *et al.*, 1994), we propose two single equation approaches to obtain the long-run estimates of the financial development equation: the fully-modified unrestricted error-correction model (FM-UECM) and dynamic ordinary least squares (DOLS) estimator. The FM-UECM estimator of Inder (1993) involves estimating the long-run parameters by incorporating adequate dynamics into the specification to avoid omitted lagged variable bias, as given in Eq. (4).

$$FD_t = \alpha_0 + \sum_{j=1}^{k} \beta_j DET_{j,t} + \sum_{i=0}^{p} \gamma_i \Delta FD_{t-i} + \sum_{i=0}^{p} \sum_{j=1}^{k} \delta_{ji} \Delta DET_{j,t-i} + \varepsilon_t \tag{4}$$

where DET_t is a vector of k determinants of FD_t. However, this approach may not be asymptotically optimal given that it takes no account of the possible endogeneity of the income variable. In view of this, we follow Bewley (1979) by using the instrumental variable technique to correct the standard errors so that valid inference can be drawn. Specifically, lagged level terms are used as the instruments for the first differenced terms to correct for endogeneity bias. Next, the short-run effects are removed by defining:

$$FD_t^* = FD_t - \hat{\alpha}_0 - \sum_{j=1}^{k} \hat{\beta}_j DET_{j,t} - \sum_{i=0}^{p} \hat{\gamma}_i \Delta FD_{t-i} - \sum_{i=0}^{p} \sum_{j=1}^{k} \hat{\delta}_{ji} \Delta DET_{j,t-i} \tag{5}$$

The fully modified estimator is then obtained by employing the Phillips-Hansen non-parametric corrections to the regression of FD_t^* on $DET_{j,t}$. The resulting estimator thus adequately deals with omitted lag variables bias and has been shown to be asymptotically optimal, even in the presence of endogeneous explanatory variables (Inder, 1993). Caporale and Pittis (2004) have shown that this estimator possesses the most desirable small sample properties in a class of 28 estimators.

The DOLS procedure of Stock and Watson (1993) is asymptotically equivalent to the maximum likelihood estimator of Johansen (1988), and it has been shown to perform well in finite samples. The estimation involves regressing one of the $I(1)$ variables on the remaining $I(1)$ variables, the $I(0)$ variables, leads and lags of the first difference of the $I(1)$ variables, and a constant, as shown in Eq. (6). By doing so, it corrects for potential endogeneity problems and small sample bias, and provides estimates of the cointegrating vector which are asymptotically efficient.

$$FD_t = \alpha_0 + \sum_{j=1}^{k} \beta_j DET_{j,t} + \sum_{i=-p}^{p} \sum_{j=1}^{k} \delta_{ji} \Delta DET_{j,t-i} + \varepsilon_t \tag{6}$$

The long-run model for FD_t can be obtained from the reduced form solution by setting all short-run dynamic terms to be zero. The error-correction term (ECT) can be obtained by taking $FD_t - \alpha_0 - \beta_1 DET_{1,t} - \beta_2 DET_{2,t} - ... - \beta_k DET_{k,t}$ to formulate an error-correction model. The ECT captures the evolution process on the variable of concern by which agents adjust for prediction errors made in the last period. The general-to-specific modelling approach is adopted to derive a satisfactory short-run dynamic model. This involves testing down the general model by successively eliminating statistically insignificant regressors and imposing data acceptable restrictions on the parameters to obtain the final parsimonious dynamic equation.

5. Results

5.1 Integration and cointegration analyses

Two standard unit root tests are used to assess the order of integration of the underlying variables - the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results reported in Table 2 reveal 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 1% level of significance. Given that all underlying variables share common integration properties, we can now proceed to testing for the presence of a long-run cointegrated relationship between the variables.

Table 2: Unit root tests

	ADF		*PP*		Conclusion
	Levels	First-differenced	Levels	First-differenced	
CCY_t	-2.145	-6.357***	-1.563	-6.491***	$I(1)$
CPY_t	-1.676	-7.326***	-1.709	-7.326***	$I(1)$
MMY_t	-1.919	-6.147***	-1.899	-6.189***	$I(1)$
ED_t	1.818	-7.599***	1.554	-7.607***	$I(1)$
IRR_t	-1.861	-7.254***	-1.807	-7.404***	$I(1)$
CRR_t	-1.265	-5.877***	-1.312	-5.922***	$I(1)$
SLR_t	-1.857	-6.097***	-1.376	-6.157***	$I(1)$
DCP_t	-2.493	-9.263***	-2.367	-9.422***	$I(1)$
$VCPI_t$	-2.411	-5.439***	-2.505	-7.780***	$I(1)$

Notes: *** indicates 1% level of significance. For ADF, AIC is used to select the lag length and the maximum number of lags is set to be five. For PP, Barlett-Kernel is used as the spectral estimation method. The bandwidth is selected using the Newey-West method.

It is well-known that the Johansen approach may be sensitive to the choice of the lag length, we therefore conduct a series of nested likelihood ratio tests on first-differenced VARs to determine the optimal lag length prior to performing cointegration tests. Given the sample size, we have considered a maximum lag length of five. The optimal lag length is found to be one in both models. Cointegration tests are then performed for the VARs at levels. In Table 3, both the results of Johansen trace and maximum eigenvalue tests unanimously point to the same conclusion that there is only one cointegrating vector, at the 5% level of significance.

Table 3: Johansen cointegration tests

Hypothesis	Maximum Eigenvalue Test Statistics [Trace Test Statistics] (1) $FD_t = CCY_t$	(2) $FD_t = CPY_t$	(3) $FD_t = MMY_t$	5% critical value
$r = 0$	46.325** [142.986**]	52.127** [148.487**]	50.534** [144.628**]	46.310 [127.050]
$r \leq 1$	27.934 [96.661]	28.723 [96.360]	26.728 [94.094]	40.190 [97.260]
$r \leq 2$	23.399 [68.727]	24.248 [67.637]	23.847 [67.367]	34.030 [71.440]
$r \leq 3$	16.952 [45.328]	18.498 [43.389]	22.045 [43.519]	27.800 [49.640]
$r \leq 4$	13.041 [28.376]	12.121 [24.891]	12.423 [21.474]	21.490 [31.880]
$r \leq 5$	11.401 [15.336]	8.625 [12.770]	5.177 [9.051]	15.020 [21.490]
$r \leq 6$	3.935 [3.935]	4.144 [4.145]	3.874 [3.874]	8.190 [8.190]

Notes: Trace statistics are reported in brackets. The indicators of financial development are normalized as the dependent variables. r is the number of cointegrated vector. Critical values for the tests follow MacKinnon *et al.* (1999). ** indicates 5% level of significance.

5.2 Causality tests

There is a large body of literature focusing on testing the causal relationship between the growth rate of financial development and economic growth. However, the results do not yield conclusive finding on the direction of causality. Given that our variable of interest is financial development, it is important to establish that it has no causal impact on real economy. Following the results of cointegration tests, we perform the ECM-based causality tests. The two sources of causation are the error-correction term and the lagged dynamic terms. Given these sources of causality, we can perform three different causality tests, i.e., short-run Granger non-causality test, weak exogeneity and strong exogeneity tests.

To perform the short-run Granger non-causality test, we test the significance of the lagged dynamic terms using the Wald test. Non-rejection of the null implies economic growth does not Granger-cause growth in financial development in the short-run. The weak exogeneity test is a notion of long-run non-causality test. 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 error-correction term. That is, the strong exogeneity test requires Granger non-causality and weak exogeneity. 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.

Table 4: Causality tests between ΔFD_t and ΔED_t

		$H_0 : \Delta ED_t \nrightarrow \Delta FD_t$	
Model	Short-run Granger non-causality test	Weak exogeneity test	Strong exogeneity test
(1) $FD_t = CCY_t$	5.732** (0.021)	8.027*** (0.007)	5.629*** (0.007)
(2) $FD_t = CPY_t$	12.598*** (0.001)	2.232 (0.142)	6.501*** (0.003)
(3) $FD_t = MMY_t$	5.466** (0.024)	6.630** (0.013)	4.729** (0.014)
		$H_0 : \Delta FD_t \nrightarrow \Delta ED_t$	
Model	Short-run Granger non-causality test	Weak exogeneity test	Strong exogeneity test
(1) $FD_t = CCY_t$	0.205 (0.653)	0.488 (0.489)	0.286 (0.753)
(2) $FD_t = CPY_t$	0.174 (0.678)	0.042 (0.838)	0.164 (0.849)
(3) $FD_t = MMY_t$	0.103 (0.749)	1.359 (0.249)	0.681 (0.511)

Notes: CCY_t = ln (credit to the commercial sector / GDP); CPY_t = ln (credit to the private sector / GDP); MMY_t = ln (M3 – M1 / GDP); ED_t = ln GDP; *p*-values are reported in parentheses; ** and *** indicate 5% and 1% level of significance, respectively.

On the basis of the results reported in Table 4, we find evidence of economic growth causing (in the Granger sense) growth in financial development both in the short-run and long-run, but no feedback relationship is observed. The evidence is further supported by the results of the strong exogeneity tests which show the overall causality for both short-run and long-run. The findings indicate that economic growth exerts a positive and uni-directional causal effect on the growth rate of financial development, consistent with the time series evidence of Ang and McKibbin (2007) who have found no support for the finance-led growth hypothesis for the Malaysian experience. In sum, the causality tests indicate that the growth rates of GDP is a reasonably good predictor of financial development.

5.3 Long-run and short-run estimates

Based on the results of the causality tests, we treat ED_t as a long-run forcing variable for FD_t in the specification. The long-run elasticities of the financial development equation are estimated using two different time series approaches, i.e., the FM-UECM and DOLS procedures. In general, these two approaches give quite similar results. All variables enter the long-run equation significantly at the conventional levels. The signs and magnitudes of the coefficients also appear reasonable.

Economic development enters the long-run equation significantly at the 1% level with the expected positive sign. Specifically, the long-run elasticity of financial development with respect to economic development is found to be in the range of 0.834–1.078. The results imply that the process of financial development in India has been shaped by a higher level of economic activity, which results in an increased demand for financial services. Such a finding is by and large consistent with the literature (see, e.g., Ang and McKibbin, 2007). Since economic expansion serves to deepen the financial system, greater efforts by the government are necessary to ensure sustained development in the economy.

The long-run elasticities of financial development with respect to interest rate restraints are found to be 0.001 across all models. The results are not sensitive to different financial development indicators and estimators used. The results imply that the interest rate restraints imposed on the Indian financial system seem to have deepened the financial system, although its effect is rather small. This finding is largely consistent with Ang (2008a) for the Malaysian experience. It is also broadly consistent with the theoretical arguments put forward by van Wijnbergen (1982), Taylor (1983), Stiglitz (1994) and Hellmann *et al.* (1996), among other.

Cash reserve requirements enter the equation significantly, but with varying effects. Specially, its long-run elasticity is found to be negative in the models that use CCY_t and CPY_t as the indicators of financial development. The coefficients are quite precisely estimated at the conventional levels. However, for the models that use MMY_t as the indicator, a positive effect is found. Hence, the effect of reserve requirements on financial development appears to be ambiguous, although more evidence of a negative effect is found, which supports the propositions of Kim and Santomero (1988) and Gennotte and Pyle (1991). The results from all models show a significant positive effect of statutory liquidity requirements, with long-run elasticities in the range of 0.015–0.043. Thus, the evidence points to the importance of maintaining adequate capital liquidity to ensure the smooth functioning of the financial system. The findings are, by and large, consistent with the theoretical propositions of Courakis (1984) and Bencivenga and Smith (1992) under certain conditions.

Table 5: The effects of financial sector policies on financial development

	FM-UECM			*DOLS*		
	$FD_t=CCY_t$	$FD_t=CPY_t$	$FD_t=MMY_t$	$FD_t=CCY_t$	$FD_t=CPY_t$	$FD_t=MMY_t$
I. The long-run equilibrium level relationship						
Intercept	-10.454***	-10.111***	-12.118***	-10.843***	-10.429***	-12.287***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ED_t	0.880***	0.834***	1.069***	0.913***	0.869***	1.078***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
IRR_t	0.001***	0.001***	0.001***	0.001*	0.001**	0.001*
	(0.003)	(0.007)	(0.002)	(0.065)	(0.034)	(0.063)
CRR_t	-0.011***	-0.012**	0.029***	-0.028***	-0.023***	0.032**
	(0.004)	(0.015)	(0.001)	(0.000)	(0.003)	(0.011)
SLR_t	0.033***	0.031***	0.015*	0.043***	0.036***	0.019*
	(0.000)	(0.000)	(0.057)	(0.000)	(0.000)	(0.061)
DCP_t	0.139***	0.140***	0.223***	0.101***	0.108***	0.190***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$VCPI_t$	-0.076***	-0.095***	-0.199***	-0.083***	-0.094***	-0.231***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
II. The short-run dynamic model						
Intercept	0.018**	0.034***	0.043***	0.032***	0.033***	0.044***
	(0.047)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
ECT_{t-1}	-0.243***	-0.339***	-0.170**	-0.277***	-0.329***	-0.164**
	(0.003)	(0.000)	(0.016)	(0.000)	(0.000)	(0.023)
ΔDCP_t	0.051***	-	-	0.043**		
	(0.009)			(0.017)		
$\Delta VCPI_t$	-0.041***	-0.030*	-0.059***	-0.045***	-0.032**	-0.062***
	(0.004)	(0.051)	(0.005)	(0.001)	(0.038)	(0.005)
ΔMMY_{t-1}	-	-	0.264**	-	-	0.259*
			(0.048)			(0.055)
ΔDCP_{t-1}	0.036**	-	-	0.036**	-	-
	(0.046)			(0.034)		
III. Diagnostic checks						
$\chi^2_{NORMAL}(2)$	1.155	1.835	15.595***	0.499	20206	17.613***
	(0.561)	(0.399)	(0.001)	(0.779)	(0.332)	(0.001)
$\chi^2_{SERIAL}(1)$	1.454	3.840*	1.846	0.248	3.181*	1.287
	(0.228)	(0.051)	(0.174)	(0.618)	(0.074)	(0.257)
$\chi^2_{SERIAL}(2)$	1.656	3.937	2.195	0.280	3.382	1.935
	(0.437)	(0.139)	(0.334)	(0.869)	(0.186)	(0.380)
$\chi^2_{ARCH}(1)$	0.394	3.284*	0.169	0.041	3.389*	0.066
	(0.530)	(0.069)	(0.681)	(0.839)	(0.066)	(0.797)
χ^2_{WHITE}	4.997	1.241	2.504	5.068	1.306	2.537
	(0.757)	(0.871)	(0.868)	(0.750)	(0.860)	(0.864)
$\chi^2_{RESET}(1)$	0.001	0.992	0.166	0.784	0.898	0.175
	(0.991)	(0.319)	(0.683)	(0.349)	(0.343)	(0.676)

Notes: $\chi^2_{NORMAL}(2)$ refers to the Jarque-Bera statistic of the test for normal residuals; $\chi^2_{SERIAL}(1)$ and $\chi^2_{SERIAL}(2)$ are the Breusch-Godfrey LM test statistics for no first and second order serial correlation, respectively; $\chi^2_{ARCH}(1)$ is the Engle's test statistic for no autoregressive conditional heteroskedasticity; χ^2_{WHITE} denotes the White's test statistic to test for homoskedastic errors, with degrees of freedom equal to the number of slope coefficients; $\chi^2_{RESET}(1)$ is the Ramsey's test statistic for no functional misspecification. Figures in parentheses are *p*-values. *, ** and *** indicate 10%, 5% and 1% level of significance, respectively.

The extent of directed credit programs is found to have a favourable effect on development of the Indian financial system, consistent with Schwarz (1992). The coefficients, in the range of 0.101-0.223, enter the financial development equations significantly in all models with a positive sign. Consistent with its long-run counterpart, the effect of directed credit controls is found to be significant in the short-run in the model that uses CCY_t as the proxy for financial development. The results seem to suggest that directing funds to certain priority sectors in the economy is an effective mechanism to deepen the financial system. Macroeconomic uncertainty is found to exert a negative influence on financial development. The results are consistent in across all regressions. The long-run elasticities are found to be much larger in the models that use MMY_t as the proxy for financial development. A similar finding is obtained in the short-run dynamic model, based on the coefficients reported on $\Delta VCPI_t$.

The error-correction term in the short-run dynamic model is statistically significant at the 5% level and correctly signed. This provides further evidence against the absence of a long-run relationship for the financial development equation. The magnitude of its coefficients provides a measure of the speed of adjustment back to the long-run equilibrium. Using CCY_t as the measure for financial development, the economy takes 3.6–4.1 years to achieve long-run equilibrium when there is a deviation from equilibrium. The restoration to equilibrium takes slightly shorter when CPY_t is used, and slightly longer when MMY_t is used as the measure for financial development. The crisis dummy is found to be insignificant in all cases, and therefore dropped from the estimation.

5.4 Robustness checks

In order to test the robustness of the results, all estimations are subject to various diagnostic tests. Except for the model that uses MMY_t as the financial development indicator, which fails the normality test at the 1% percent level, the regression specifications fit remarkably well and pass the diagnostic tests against normality, first and second order serial correlation, autoregressive conditional heteroskedasticity, White's heteroskedasticity, and Ramsey's functional specification, at the 5 percent level of significance. Structural stability of the equations is examined using the cumulative sum (CUSUM) and CUSUM of squares tests on the recursive residuals. In all equations, the test statistics are generally within the 5% confidence interval band, suggesting that the estimated models are somewhat stable over the sample period. The actual and predicted series of each equation are also compared, which show that the predicted series track the actual series very closely over time for all models.[2] Finally, in view that there was little control imposed on the Indian

[2] The results of CUSUM and the comparison of actual and predicted series are not reported here to conserve space. They are available upon request.

financial system in the 1950s, we have also experimented by restricting the estimation period to a shorter sample of 1960-2005. The results do not significantly alter the main findings in this study.

5.5 Further discussion of results

How could the above results be interpreted within the specific context of India? Firstly, our results indicate that interest controls have a positive effect on deepening the financial system in India. This finding is not surprising given that the deregulation of lending rates may increase the cost of borrowing and the removal of deposit interest floors may discourage financial savings. The former increases the cost of capital for entrepreneurs whereas the latter reduces the amount of credit available to them. The extent of interest rate restraints in India rose sharply following the direct intervention of the Reserve Bank of India in the setting of interest rates in 1963. Despite these regulations, the ratio of M3 to GDP increased significantly from 24% to 51% during the period 1963-1988. This process of saving mobilization was much quicker than many other developing countries during the same period, and reflected a high propensity to save and confidence in the banking system. Given India's closed capital account regime, high saving mobilization has provided ample domestic resources to facilitate lending activity. Moreover, the imposition of interest rate ceilings from the 1960s to 1980s also ensured that entrepreneurs who lacked funding were able to obtain credit at a reasonably low cost. However, it should be highlighted that financial savings may be discouraged if bank deposit rates are suppressed to a very low level. As emphasized by Chiappori *et al.* (1995) and Emran and Stiglitz (2009), financial savings will respond positively only when an optimal level of deposit ceiling is chosen.

Secondly, our results suggest that higher statutory liquidity requirements are positively related to financial development whereas an increase in the cash reserve requirements tends to retard the process of financial deepening in India. These findings are consistent with Ang (2008a) for Malaysia. Although in general one may expect an increase in the liquidity requirements to be associated with credit rationing, this may not always be the case. The finding of a positive effect of the statutory liquidity requirements suggests that adequate capital liquidity requirements are necessary to ensure the smooth functioning of the financial system. Liquidity shortages may induce insolvency problems and trigger financial instability. These requirements are particularly important for financial systems which are not sufficiently sophisticated such as one in India. For reserve requirements, it appears that their significant reductions after the liberalization have greatly expanded the amount of loanable funds, which has contributed to a process of rapid financial deepening during the 1990s. Our results therefore argue in favor of a policy of deregulation in the financial system by way of reducing the cash reserve requirements in order to boost financial intermediating activity.

Finally, our results also suggest that directed credit programs tend to promote financial development. Due to the nationalization of banks in 1969, the allocation of credit has been mainly performed by government banks. Although credit allocation under the direction of the central bank may be less efficient and subject to the risks of biased assessments, it appears that these negative effects have little effect on financial development in India. Instead, central allocation of credit has significantly benefited some farmers and small traders, who would otherwise be denied credit, by allowing them to have adequate access to finance. The presence of directed credit programs, which remains significant today despite the major phase of financial liberalization that occurred in 1991, appears to have played a significant role in facilitating financial intermediating activity in India. This finding, however, stands in sharp contrast to the results of Ang (2008a) for the Malaysian experience. In the case of Malaysia, a series of directed credit programs pertaining to the native Malay community were implemented from 1975, following the institution of the New Economic Policy (NEP) in 1970. Although credit allocation by the government may have succeeded in bringing the native Malays into business, it has largely resulted in the transfer of paper wealth from one company to another in the interests of the politically well-connected few.

6. Concluding Remarks

Using annual time series data for the period 1950-2005, this paper attempts to assess the effects of several types of financial sector policies, including interest rate controls, statutory reserve requirements, directed credit programs and capital liquidity requirements, on development of the financial system in India. The study highlights that since financial sector policies may have different effects on financial development, it is important to consider each component of financial reforms separately. Using the Johansen cointegration techniques, the results show a robust long-run relationship between financial development and its determinants. The causality tests indicate that the growth rates of GDP is a reasonably good predictor of evolution in financial development. However, this causal relationship is not bidirectional, meaning that the causality only runs from growth to finance and not in the opposite direction.

The results further suggest that financial development in India positively depends on the level of economic development. An increase in macroeconomic uncertainty is associated with a lower level of financial development. Overall, the results provide very little support for the financial liberalization thesis. Specifically, interest rate restraints appear to be an effective device for deepening the financial sector. Similarly, maintaining adequate capital liquidity and the presence directed credit programs favouring certain priority sectors seem critical for shaping the financial system. The effects of cash reserve requirements are found to be ambiguous, although a negative effect seems to dominate. Thus, our results suggest that the financial liberalization policies currently

being pursued in India are unlikely to result in financial deepening. The increased level of financial depth observed is primarily driven by higher demand for financial products and services due to increase in aggregate income. The results tend to support the proposition of Stiglitz (1994) and Hellmann *et al.* (2000) that some form of financial restraints may help deepening the financial systems.

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