Is Post-Reform Financial Development a Sufficient Condition for Economic Development? An Emerging Economy's Experience with Liberalization

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The paper undertakes a multivariate time series analysis and shows that repressed financial markets were not in themselves a justification for financial liberalization in Pakistan in the 1990s. The study tries to analyze the possible reasons for the failure of the financial reform process in Pakistan. This is done by first establishing the two legs of 'McKinnon and Shaw's transmission mechanism', through which financial development affects real economic activity. As the next step Vector Autoregressive (VAR) analysis is employed in order to regress these two legs and then multiple causality tests are run on subsequent Vector Error Correction (VEC) equations. Such an approach not only allows to take on the critiques of McKinnon and Shaw in a debonair manner, but also enables to pinpoint the shortcomings of the reform process itself.

Introduction

In 1973, Edward Shaw and Ronald McKinnon presented a new neoliberal perspective on the role of money in economic development. The economies of the developing countries, as seen by McKinnon and Shaw, are 'financially repressed' (Galbis, 1977; Mathieson, 1979 and 1980; Kapur, 1983; Fry, 1989, 1995 and 1998; and McKinnon, 1989). McKinnon and Shaw presented a strong case against financial repression policies such as nominal interest rate ceilings, controlled credit allocation, and high reserve requirements. To them, administrative resource allocation was not only inefficient but also the source of macroeconomic instability that reduced the volume of financial savings, the rate of real economic growth and the real size of the financial system relative to nonfinancial magnitudes in Less Developed Countries (LDCs). This is because, according to McKinnon, capital accumulation is the most critical element of economic growth, while Shaw emphasizes the ability of the banking system to intermediate adequate amounts of credit to finance higher economic growth. Both argue that removing interest rate and credit allocation controls will ease the repression of financial system, which would improve the rate of economic growth through increased efficiency in

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financial intermediation subject to a better financial discipline. They emphasize the salutary effects of higher interest rates on economic growth and thereby interpret the existence of too low a rate of interest as a problem; this view is opposite to that of Classicals and Keynesians (Keynes, 1936; Tobin, 1965; and Chick and Sheila, 1988).

On the basis of this financial liberalization paradigm, and also due to the poor development record in many LDCs in the 1960s and 1970s, resulting mostly from misguided interventionist policies, an increasing number of developing countries have instituted financial sector reforms. Pakistan was no exception to this phenomenon.

Before the initiation of reforms, Pakistani financial markets were significantly repressed, the brunt of which was being borne by the banking sector. State Bank of Pakistan (SBP) was increasingly facing eroding monetary control and banks were generally facing disintermediation. The imposition of global as well as sectoral credit ceilings, the creation of a number of Non-Bank Financial Institutions (NBFIs), the Central Directorate of National Savings (CDNS), and the continuously high borrowing requirements of the government were all contributory factors to this repression.

To eliminate this repression in financial sector and to realize its macroeconomic plans, Pakistan undertook ambitious financial reforms in the early 1990s, which aimed to move the government away from its predominantly direct monetary control regime and increase the dynamism of the banking system. The measures implemented included: (a) Debt management reform so as to promote primary and secondary securities markets; (b) Efforts to enhance the health of, and competition within, the banking sector. The latter included large-scale privatization of nationalized banks, as well as, the advent of new scheduled commercial and investment banks; (c) Exchange and payment reforms, which alleviated portfolio restrictions by allowing domestic residents to hold foreign currency accounts; (d) The paring down of concessional and direct credit schemes and the setting up of a 'Credit Commission' to review the viability of the existing schemes; and (e) The establishment of a prudential supervisory framework to foster sounder credit decisions. This included the imposition of prudential regulations on banks and NBFIs, as well as, widespread changes in the central banks' structure and method of operations.

But the years to come after these reforms were to witness the ever-deteriorating situation of Pakistani economy in nearly all fronts. The liberalized financial sector was not able to achieve the objective[1] the policy makers had in their mind. The economy continued to be trapped in a vicious circle of poverty, low growth, low savings, and low investment, which further hampered growth and poverty alleviation.

This paper tries to find out the rationale, which apparently lead McKinnon and Shaw's (MS) thesis of financial liberalization to fail in Pakistani case. This is primarily done by addressing two fundamental questions which shall enable us to discern where the MS thesis lapsed:

[1] The objective of liberalization was to enable the Pakistani economy to grow faster and perform better as proposed by McKinnon and Shaw's thesis.

1. Did financial liberalization lead to financial development in Pakistan?

2. If it did, whether this established financial development led to an increased real economic activity as proposed in the MS thesis?

or

What is the degree and nature of contribution of financial liberalization in real sector activity?

Liberalization and Growth: An Econometric Test for the Validity of MS Thesis

On the one hand, positive gains from financial liberalization in Pakistan after 1990s were neutralized by a sudden rise in interest rates which also had negative repercussions for real economic activity. On the other hand, the failure of the MS thesis could be due to an existent two-way relationship between financial development and economic growth. Such two-way causality might elucidate the observed anomaly in MS transmission mechanism by revealing why Pakistani real sector could not accrue any gains, despite significant improvements in financial sector after the 1990s.

In order to discern the source for the failure of MS transmission mechanism, we proceed first by identifying the two legs through which interest rates and financial development improve real economic activity as suggested in the classical MS thesis.

The first leg implies that after liberalization, the financial markets offer higher returns on the saving instruments (e.g., deposits) and thus attract higher levels of savings from the household. Additionally, financial development also takes place with the abolition of restrictions (i.e., credit ceilings) prevailing in the system. In response to liberalized/ improved financial system, financial savings would increase and so does the private savings which are then utilized by investors, resulting in an outright expansion of investment and growth. The second leg concentrates on the allocative efficiency of the financial sector. The liberalized financial system allocates resources to more competent investors. One indicator of such efficiency is that the financial sector channelizes more and more loans to the private sector which is generally considered to be more proficient than the public sector. The second leg only captures the allocative efficiency part because MS transmission is completed only when the financial sector gives loans or credit to the most competent users. However, we can infer that more loans to the private sector also means an improvement in the productive efficiency of the country because of the addendum in capital-intensive projects[2] accrued by the competent private investors. An enhanced productive efficiency in turn also assures higher growth.

Please note that the MS transmission affects real economic activity by influencing the savings or allocative efficiency variables. The implication of financial liberalization on

[2] The capital-intensive projects need more resources. Thus, according to McKinnon and Shaw, increased private savings (first leg of the transmission) enables the investors to go for more capital-intensive projects.

economic growth, investment or productive efficiency variables is thus through these two key variables.

The two legs of MS transmission, explained above, can be written in equation form as:

$$S_p = \alpha_1 + \alpha_2 RDR + \alpha_3 M_2 + \alpha_4 TV + \alpha_4 MC + \varepsilon_1 \quad ...(1)$$

$$PC/DC = \beta_1 + \beta_2 RDR + \beta_3 M_2 + \beta_4 TV + \beta_4 MC + \varepsilon_2 \quad ...(2)$$

where S_p = Private savings/GDP, *PC* = Credit to private sector, *DC* = Credit to domestic sector, *RDR* = Real deposit rate, M_2 = Broad definition of Money/GDP, *TV* = Stock market turnover/GDP, and *MC* = Stock market capitalization/GDP.

Model (1) is the first leg, which indicates that private savings depends upon interest rates and different indicators of financial development[3] as proposed by the classical MS thesis. While real deposit rate (*RDR*) is a proxy for the real interest rates, (*M*2/*GDP*) is a measure of financial deepening in the banking sector. The development in the stock markets is captured by market turnover (*TV*) and market capitalization (*MC*). *TV* indicates the liquidity in the secondary markets[4] and *MC* shows its size.[5] Model (2) shows the second leg of MS transmission mechanism where allocative efficiency (*PC*/*DC*)[6] is the function of the same set of exogenous variables as in Model (1). It is noteworthy that two variables for stock market activity, namely, trading volume and market capitalization, have been included in the above equations, whereas only one variable for banking activity has been considered.

We propose two additional equations since we know that finance-growth nexus is an indirect implication of the MS thesis and is not captured in the MS transmission mechanism. This will help us to know the nature of relationship of allocative efficiency and private savings with economic growth.[7]

$$\delta_1 \ln GDP = \delta_2 S_p + \delta_3 E + \delta_4 (PC/DC) + \varepsilon_3 \quad ...(3)$$

$$\gamma_1 E = \gamma_2 (PC/DC) + \varepsilon_4 \quad ...(4)$$

where *E* = Productive Efficiency = GDP/Employment.

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3 These different selected indicators of financial development are discussed subsequently. They indicate activity in the banking sector as well as stock markets. The stock market indicators are considered because of the active role these markets play in the financial system of a country.

4 Liquidity allows investors to alter their portfolios quickly and cheaply, thereby, facilitating long-term as well as more profitable investments. Liquidity is an important attribute of stock market because liquid markets improve the allocation of capital and enhance prospects of long-term growth.

5 Market capitalization equals the value of listed shares.

6 *PC*/*DC* captures the allocative efficiency of the financial system because it captures the importance given to private sector compared to the public sector. A rise in this variable over time shows that financial sector is allocating more resources to the efficient private sector.

7 Such an exercise will enable us to know in more detail the role finance has played in the overall economic situation of Pakistan.

Model (3) gives the relationship between GDP growth and private savings, productive efficiency and allocative efficiency, while establishing a relationship between *E* and *PC/DC* in Model (4) enables us to analyze more precisely the role played by the latter variable in GDP growth rate.[8]

There is possibility of a two-way causation between financial development and economic growth. Under such a possibility, we cannot explicitly assume the endogeneity of financial indicators in relation to real economic variables. Since the above equations implicitly assume that the causality goes from finance to real activity, they have to be rewritten because in case of two-way causality, our regression analysis shall lead to spurious results. One way to address this issue is to employ cointegration technique to test the validity of MS thesis. In fact, recent empirical studies have examined causality/ the direction of relationship between financial development and economic growth, as well as MS transmission mechanism in a multivariate Vector Autoregressive (VAR) framework (Arestis and Demetriades, 1997; Luintel and Khan, 1999; Kar and Pentecost, 2000; and Aluthge, 2000). The increasing popularity of the usage of VAR in the issue under hand is its dynamism. Through VAR, in a multivariate system of cointegrated variables, the framework of Johansen (1988) allows one to address the issue of long-run causality in a more formal and complete way (Hall and Milne, 1994; and Luintel and Khan, 1999). Toda and Philips (1993) recommended the Johansen framework as the efficient way of implementing Granger causality tests. In addition to this, multivariate cointegration and Vector Error Correction (VEC)[9] mechanism solve the problem of simultaneous equation bias faced in testing MS transmission mechanism in a simple OLS regression analysis (Aluthge, 2000; and Kar and Pentecost, 2000). Another advantage of using VAR is that it can be run on the variables which are non-stationary. Thus, VAR also solves the problem of stationarity, that most of the time series variables suffer from and gives robust results.

Cointegration Analysis

Cointegration analysis allows us to relax the assumption that financial development causes economic growth and to take up the criticism of two-way causality. We can rewrite Equations (1), (2), (3) and (4) as follows:

$$\alpha_1 S_p + \alpha_2 RDR + \alpha_3 M_2 + \alpha_4 TV + \alpha_4 MC = \varepsilon_1 \quad ...(5)$$

$$\beta_1 (PC/DC) + \beta_2 RDR + \beta_3 M_2 + \beta_4 TV + \beta_4 MC = \varepsilon_2 \quad ...(6)$$

$$\delta_1 \ln GDP + \delta_2 S_p + \delta_3 E + \delta_4 (PC/DC) = \varepsilon_3 \quad ...(7)$$

$$\gamma_1 E + \gamma_2 (PC/DC) = \varepsilon_4 \quad ...(8)$$

8 Since allocative efficiency leads to improvements in GDP growth by improving productive efficiency, it is necessary to know the relationship between *E* and *PC/DC*.

9 The methodology of multivariate cointegration and VEC was established by Johansen (1988) and Johansen and Juselius (1990).

The new set of Equations (5, 6, 7 and 8) are basically the typical VAR models[10] with more than one endogenous variables. In short, estimating these models not only allows us to test for both legs of MS transmission mechanism and then the finance and growth link, but the usage of VAR models and cointegration analysis also evades the econometric problems of time series, like autocorrelation or multicollinearity.[11]

The data used here are pure time series data, as we consider the monthly data of the variables specified in our models from 1980 to 2005. In general, macroeconomic theory assumes a long-run stable relationship between the levels of certain economic variables. That means a set of macroeconomic variables cannot move too far from each other. However, it is a well-known fact that most macroeconomic time series in a growing economy are non-stationary (Perman, 1991; and Dicky *et al.*, 1994), therefore, when such data series are regressed together, spurious correlation is likely to occur due to the strong trends involved in the time series in question. Since, the study deals with time series data, a test for stationarity is a very important precondition before proceeding further. In this regard, we first perform the unit root test, aiming to establish the order of integration of each variable and then perform the cointegration test to determine the number of cointegrated vectors in our models.

Test for Order of Integration

The Augmented Dickey-Fuller (ADF) test is used[12] to establish the degree of integration of each variable. Normally this test involves running of a regression of the first difference of the series, on the series itself, lagged once,[13] one or more lagged difference terms, a constant and a time trend. The most general form of the regression that is the base of ADF test therefore would look like $\Delta X_t = c_1 + c_2 t + c_3 X_{t-1} + ... + c_p \Delta X_{t-p} + \varepsilon_t$, where X denotes the variable in question, Δ the difference operator, and $c_1, c_2, c_3, c_4, ..., c_p$ are parameters to be estimated, while ε_t is the random error term.

Table 1 summarizes the results of the ADF test with an intercept and time trend, and without intercept and time trend[14] for all the variables in our model. The null hypothesis (H_0) is that X_t (the variable in question) is I(1).[15] If the calculated *t*-ratio provided by the ADF test is less than the critical value given in the McKinnon's *t*-table of critical values,[16] then we cannot reject the null hypothesis that X_t has a unit root, this implies that X_t is a non-stationary time series. According to the ADF test results given in Table 1, the null

[10] In a VAR model we can estimate the long-run relationship among the variables even if they are interdependent on each other as in case of Models (5) and (6) (where S_p, *PC*/*DC*, *RDR*, M_2, *TV* and *MC* are all endogenous variables).

[11] It can be argued with the help of the theory that Equations (1), (2), (3), and (4) were facing both the problems.

[12] According to the existing literature on time series econometric analysis, the ADF test is one of the most widely used tests to assess the integrating properties of a time series by contemporary researchers.

[13] It is a known fact that the results of the unit root test are sensitive to the number of lags included in it. To identify the optimal lag structure, Campbell and Perron (1991) have suggested the general-to-specific elimination procedure. In line with the procedure, we started estimation of each equation.

[14] This procedure was followed to avoid the danger of overdifferencing, i.e., a possibility of applying a difference operator too many times.

[15] This is the order of integration. For example, say, a variable is integrated of order *d* (it is written as I(*d*)); if it should be differenced once to become stationary it is said to be integrated of order one (written as I(1)) and so on. Thus, a stationary variable (without differencing) is supposed to be integrated of order zero (written as I(0)).

[16] In this case, McKinnon's *t*-table of critical values given in Eviews has been used.

Table 1: ADF Test Results			
Variables	**Lag Length[a]**	**With Intercept**	**With Intercept and Trend[b]**
Levels			
S_p	0	–1.8455	–3.1184
PC/DC	4	–1.7781	–1.0861
ln(*GDP*)	0	–0.8959	–1.4029
E	0	–3.288**	–3.8654**
RDR	0	–1.4461	–1.7021
M_2	0	–1.9019	–2.4255
TV	0	6.3111	–3.2525
MC	0	–1.669	–2.4406
First Differences			
Variables	**Lag Length[c]**	**With Intercept**	**With Intercept and Trend[b]**
S_p	0	–5.2787*	–5.2999*
PC/DC	0	–3.8118**	–3.6592***
ln(*GDP*)	0	–2.9586***	–2.9117
E	0	–5.2625*	–5.0928*
RDR	0	–5.7077*	–5.7714*
M_2	0	–4.7398*	–4.8478*
TV	0	–5.8026*	–6.5444*
MC	0	–5.0401*	–5.4587*

Note: *, ** and *** imply significance at 1%, 5% and 10% levels respectively; [a] Lag length is for the test statistics with intercept in the third column; [b] The Dickey-Fuller *F*-test on c_2 and c_3 (joint null hypothesis of unit root, H_0: $c_2 = c_3$).The critical values for the Dickey-Fuller *F*-test were taken from Hamilton (1994, Table B7, p. 764); [c] Lag length is common to both test statistics with and without intercept.

hypothesis of unit root at levels of all the variables, except *E*, cannot be rejected at 5% level. In other words, it implies that all series are non-stationary at levels except *E*, which is stationary at 5%. The results further suggest that all series are stationary at first difference. Therefore, we conclude that all series under investigation are integrated of order one, I(1). Since all variables in our model are integrated of the same order, we can now perform the cointegration test to obtain the number of cointegrated relationship(s) in the model.

Test for Cointegration

Given the results of the unit root test, the next step is to use the cointegration procedure to test for the existence of a long-run stable relationship in the four equations that have been specified.

The existence and the nature of cointegrating relationship between a set of variables, say X_{1t} to X_{kt} can be studied by two alternative approaches, namely Engle-Granger's approach and Johansen's approach. Here we shall adopt Johansen's approach to study cointegration and error correcting dynamics, which addresses the weaknesses in Engle-Granger procedure. In this approach, the cointegrating relationship and error correcting equations are estimated jointly in one step.[17] Consequently, the Johansen multivariate cointegration method is considered to produce more robust results when more variables are involved in the analysis. The test is normally carried out for two null hypotheses. The first null hypothesis is that the number of distinct cointegrating vectors does not exceed a specific integer, say r, less than the number of variables in the system, against the alternative that the number exceeds r. This is equivalent to the hypothesis the number of non-zero characteristic roots is r against the alternative that it is greater than r. The second null hypothesis is that the number of cointegrating vectors (non-zero characteristic roots) is equal to r against the alternative that it is equal to $r + 1$. Suppose the characteristic roots, denoted by λ_j, are arranged such that $\lambda_1 > \lambda_2 > ..... > \lambda_k$. The two null hypotheses along with the alternative hypotheses and the test statistics are as follows:

$$H_0^A : \lambda_j = 0 \text{ for all } j = r+1, ..., k$$

$$H_1^A : \lambda_j \neq 0 \text{ for at least one } j > r$$

$$\text{Test statistic: } \lambda_{trace}(r) = -n \sum_{j=r+1}^{k} \ln\left(1 - \lambda_j\right)$$

$$H_0^B : \lambda_j \neq 0 \text{ for all } j = 1, ..., r$$

$$= 0 \text{ for all } j = r+1, ..., k$$

$$H_1^B : \lambda_j \neq 0 \text{ for all } j = 1, ..., r+1$$

$$= 0 \text{ for all } j = r+2, ..., k$$

$$\text{Test statistic: } \lambda_{max}(r, r+1) = -n \ln\left(1 - \hat{\lambda}_2\right)$$

If all the characteristic roots are zero then the λ_{trace}-statistic will be equal to zero. Therefore, the acceptance of null hypothesis H_0^A for $r = 0$ implies that all the characteristic roots are zero, therefore the variables under consideration are stationary and no cointegrating relationship exists. The rejection of this null hypothesis implies that there is at least one non-zero characteristic root. For the existence of a cointegrating relationship, however, it is also required that the number of characteristic roots is less than the number of variables. This requirement is tested by the null hypothesis H_0^A for $r = k - 1$. Obviously this null hypothesis must be accepted to have a cointegrating relationship. The exact number of cointegrating relationships is determined by estimating both λ_{trace} and λ_{max} statistics for alternative values of r.

[17] *See*, for more detail Granger (1969, 1986, and 1988), Johansen (1988), and Johansen and Juselius (1990).

To apply the above testing procedure, five alternative specifications are normally formatted:

Specification 1: A VEC with no intercept and trend/a VAR with no drift and trend.

Specification 2: A VEC with intercept but no trend/a VAR with no drift or trend.

Specification 3: A VEC with intercept but no trend/a VAR with drift but no trend.

Specification 4: A VEC with intercept and trend/a VAR with drift but no trend.

Specification 5: A VEC with intercept and trend/a VAR with drift and trend.

There are two scenarios which may arise from the above testing procedure. In case we find no long-run relationship between the two variables, we do not pursue a VEC analysis which separately captures both long and short-term dynamics. In case there is a long-run cointegrating relationship, a VAR would be tested for a VEC.

The results of the multivariate cointegration analysis are reported in Table 2. The results indicate that the null hypothesis of zero cointegrating vector is rejected at 5% level for the four models at both zero period lag and one period lag. This suggests that the variables in each VAR model are cointegrated with at least one cointegrated vector. The test detected two cointegrating vectors in all the four VAR models with no lagged first difference terms and at least one cointegrating vector in the models with one lagged first difference terms. Having identified the number of cointegrating vectors, the next task is to estimate the models incorporating the identified long-run relationships with the short-run dynamics of all the variables. The technique used in this regard is the VEC mechanism, which is a state-of-art mechanism for each estimation. According to the VEC mechanism, when we have information on the number of cointegrating vectors in each model, for any set of such cointegrated relationships there exists a valid error correction representation of the data. This is called the error correction term in the literature, and it is capable of measuring the deviation of the dependent variable from its long-run trend through an inclusion of error correction term(s) into equation(s), depending on the number of cointegrated relationships found in the model.

The Nature of Cointegrating Relationship

We now discuss the nature of long-run relationship between the variables in hand for all the four VAR models. First, it is noteworthy that in the estimation of cointegration relationship, the coefficient of one of the variables is normalized to 1 in each equation. For example, the focus of our analysis in Model (5) is S_p, for convenience of analysis we have normalized the coefficient of this variable in all the cointegrating relationships for Equation (5). Likewise, coefficients of PC/DC in Model (6), $\ln(GDP)$ in Model (7), and E in Model (8) are normalized to 1 for all the cointegration relationships of their respective models.

We can now write the estimated forms of Models (5), (6), (7) and (8) as follows:

$$(1)S_p + \hat{\alpha}_2 RDR + \hat{\alpha}_3 M_2 + \hat{\alpha}_4 TV + \hat{\alpha}_5 MC = 0 \quad ...(9)$$

Table 2: Johansen Test for Multiple Cointegrating Vectors

Specification 1			Specification 2			Specification 3			Specification 4			Specification 5		
H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*
Equation (7), Variables: ln(*GDP*), S_p, *E*, *PC/DC*														
$p = 0$														
$r = 0$	79.48*	59.46	$r = 0$	104.53*	76.07	$r = 0$	97.76*	68.52	$r = 0$	132.14*	87.31	$r = 0$	114.32*	77.74
$r = 1$	36.11	39.89	$r = 1$	53.47*	53.12	$r = 1$	49.10*	47.21	$r = 1$	78.36*	62.99	$r = 1$	60.76*	54.64
$r = 2$	14.2	24.31	$r = 2$	29.08	34.91	$r = 2$	24.81	29.68	$r = 2$	34.34	42.44	$r = 2$	28.11	34.55
$p = 1$														
$r = 0$	61.99*	59.46	$r = 0$	77.34*	76.07	$r = 0$	68.55*	68.52	$r = 0$	98.30*	87.31	$r = 0$	83.93*	77.74
$r = 1$	37.40	39.89	$r = 1$	52.74	53.12	$r = 1$	44.14	47.21	$r = 1$	53.73	62.99	$r = 1$	47.77	54.64
$r = 2$	19.45	24.31	$r = 2$	30.67	34.91	$r = 2$	22.13	29.68	$r = 2$	31.10	42.44	$r = 2$	25.88	34.55
Equation (6), Variables: *PC/DC*, *RDR*, M_2, *TV*, *MC*														
$p = 0$														
$r = 0$	72.33*	59.46	$r = 0$	96.02*	76.07	$r = 0$	89.26*	68.52	$r = 0$	116.02*	87.31	$r = 0$	99.77*	77.74
$r = 1$	33.63	39.89	$r = 1$	50.05	53.12	$r = 1$	45.67	47.21	$r = 1$	68.59*	62.99	$r = 1$	62.21*	54.64
$r = 2$	16.55	24.31	$r = 2$	27.96	34.91	$r = 2$	24.60	29.68	$r = 2$	33.91	42.44	$r = 2$	27.59	34.55
$p = 1$														
$r = 0$	95.09*	59.46	$r = 0$	109.28*	76.07	$r = 0$	102.44*	68.52	$r = 0$	131.18*	87.31	$r = 0$	107.88*	77.74
$r = 1$	46.91*	39.89	$r = 1$	61.03*	53.12	$r = 1$	54.30*	47.21	$r = 1$	68.53*	62.99	$r = 1$	51.17	54.64
$r = 2$	20.71	24.31	$r = 2$	31.81	34.91	$r = 2$	26.34	29.68	$r = 2$	34.05	42.44	$r = 2$	26.83	34.55

Table 2 (Cont.)

Specification 1			Specification 2			Specification 3			Specification 4			Specification 5		
H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*	H_0	*ME*	*CV (5%)*
Equation (7), Variables: ln(*GDP*), S_p, *E*, *PC/DC*														
$p = 0$														
$r = 0$	72.75*	24.31	$r = 0$	82.28*	34.91	$r = 0$	28.63	29.68	$r = 0$	39.73	42.44	$r = 0$	38.03*	34.55
$r = 1$	15.62*	12.53	$r = 1$	25.09*	19.96	$r = 1$	12.09	15.41	$r = 1$	16.89	25.32	$r = 1$	15.27	18.17
$r = 2$	0.66	3.84	$r = 2$	10.03*	9.24	$r = 2$	0.99	3.76	$r = 2$	2.17	12.25	$r = 2$	1.55	3.74
$p = 1$														
$r = 0$	27.69*	24.31	$r = 0$	38.69*	34.91	$r = 0$	30.88*	29.68	$r = 0$	52.63*	42.44	$r = 0$	51.25*	34.55
$r = 1$	8.22	12.53	$r = 1$	18.08	19.96	$r = 1$	11.43	15.41	$r = 1$	20.69	25.32	$r = 1$	19.79*	18.17
$r = 2$	0.41	3.84	$r = 2$	7.53	9.29	$r = 2$	0.90	3.76	$r = 2$	5.35	12.25	$r = 2$	5.25*	3.74
Equation (8), Variables: *E*, *PC/DC*														
$p = 0$														
$r = 0$	13.48*	12.53	$r = 0$	18.36	19.96	$r = 0$	18.27*	15.41	$r = 0$	28.88*	25.32	$r = 0$	23.79*	18.17
$r = 1$	0.02	3.84	$r = 1$	4.76	9.24	$r = 1$	4.69*	3.76	$r = 1$	4.74	12.25	$r = 1$	4.73*	3.74
$p = 1$														
$r = 0$	8.65	12.53	$r = 0$	14.26	19.96	$r = 0$	16.12*	15.41	$r = 0$	27.13*	25.32	$r = 0$	27.10*	18.17
$r = 1$	0.05	3.84	$r = 1$	5.35	9.24	$r = 1$	5.25*	3.76	$r = 1$	6.51*	12.25	$r = 1$	6.55*	3.74

Note: *r* the number of cointegrating vectors; *p* lag length, * implies significant at 5% level.

$$(1)(PC/DC)+\hat{\beta}_2 RDR+\hat{\beta}_3 M_2+\hat{\beta}_4 TV+\hat{\beta}_5 MC=0 \quad ...(10)$$

$$(1)\ln GDP+\hat{\delta}_2 S_p+\hat{\delta}_3 E+\hat{\delta}_4 (PC/DC)=0 \quad ...(11)$$

$$(1)E+\hat{\gamma}_2 (PC/DC)=0 \quad ...(12)$$

The estimated coefficients of Equations (9, 10, 11 and 12) represented by the parameters ($\hat{\alpha}_2, \hat{\alpha}_3, \hat{\alpha}_4$ and $\hat{\alpha}_5$), ($\hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4$ and $\hat{\beta}_5$), ($\hat{\delta}_2, \hat{\delta}_3$ and $\hat{\delta}_4$) and ($\hat{\gamma}_2$) respectively, are presented in Table 3. Since we cannot claim any particular variable to be dependent or independent categorically due to the very nature of Johansen's approach, the parameters of any of the four equations (i.e., $\hat{\alpha}_2, \hat{\alpha}_3, \hat{\alpha}_4$ and $\hat{\alpha}_5$) could be interpreted in more than one ways, depending upon which particular variable is taken as the dependent variable. For example, if it is assumed that in Equation (9), S_p is endogenous, while the other variables are exogenous, their respective estimated coefficients are interpretable as the negative of change in savings in the private sector due to the changes in the level of real deposit rate, financial deepening, market capitalization and financial liquidity respectively. Thus, it will be a test of the first leg of MS transmission mechanism. But let us assume that we do not know whether S_p is dependent upon these set of financial variables or is in fact interrelated. This assumption will lead us to conclude from the results, only the nature of long-term relationship among private savings and financial variables. Later in this section, running of the causality tests will enable us to know the direction of the relationship and then we can comment on MS transmission mechanism with more authenticity. However, it also follows from Model (9) that a negative (positive) value of the parameter $\hat{\alpha}_2$, for example, indicates a positive (negative) relationship between the S_p and *RDR*. The signs of the other cointegrating coefficients for all the four equations have similar interpretation.

The results of Model (9) show that there exists a negative long-run relationship between private savings and deposit rates (see Table 3). This result contradicts the MS thesis, and establishes the fact that interest rates had negative effects on real economic activity in Pakistan after liberalization.[18] This confirms that a sharp rise in real interest rates after liberalization have contributed negatively to real economic activity. One possible explanation for this was given by the structuralists. Pakistan has deep-rooted and well-developed informal markets after decades of financial repression during pre-1990s. It seems that what happened in Pakistan was a credit squeeze in the curb markets due to fall in private savings allocated to these markets (due to interest rate distortion). Since, the official banking sector in Pakistan failed to increase the credit supply to compensate for the decline in credit flow from the curb markets to productive firms,[19] there was a decline in investment and economic growth. However, even if we do

[18] We ran cointegration tests on Model 9 for the period 1970-1990. The results suggested a positive relationship between S_p and *RDR*. This means that for Pakistan, low interest rates in a financially repressed atmosphere were less harmful to the real activity, than the shooting up of these rates after liberalization.

[19] Money multiplier for informal financial institutions is greater than their formal counterparts because of no reserve requirement from the bank.

Table 3: Cointegration Coefficients					
Variables	**Specification 1**	**Specification 2**	**Specification 3**	**Specification 4**	**Specification 5**
Equation (9), Variables: S_p, *RDR*, M_2, *TV*, *MC*					
S_P	1	1	1	1	1
RDR	0.38 (4.54)*	0.401 (4.337)*	0.407 (4.59)*	1.205 (3.93)*	1.144 (4.42)*
M_2	–8.23 (7.65)*	–6.632 (–2.646)*	–5.12 (–2.66)*	–3.97 (–5.53)*	–4.959 (–5.76)*
TV	–0.515 (–0.15)	–0.679 (–0.202)	–1.559 (–0.488)	–7.84 (–3.87)*	–7.809 (–4.10)*
MC	–0.423 (–3.22)*	–0.461 (–6.93)*	–0.4505 (–7.089)*	–0.525 (–3.93)*	–0.502 (–4.606)*
Equation (10), Variables: *PC/DC*, *RDR*, M_2, *TV*, *MC*					
PC/DC	1	1	1	1	1
RDR	–0.0030 (–3.62)*	–0.0028 (–3.079)*	–0.00285 (–3.090)*	–0.0095 (-8.803)*	–0.0084 (–7.86)*
M_2	–1.486 (–7.64)*	–1.599 (–9.169)*	–1.569 (–9.241)*	–0.6902 (-4.637)*	–0.8803 (–6.253)*
TV	–0.0022 (–0.073)	–0.0011 (–0.037)	–0.00109 (–0.0369)	–0.0075 (-0.2718)	–0.0189 (0.720)
MC	–0.006 (–9.29)*	–0.0063 (–9.44)*	–0.0064 (–9.54)*	–0.00497 (-9.21)*	–0.0055 (–10.86)*
Equation (11), Variables: ln(*GDP*), S_p, *E*, *PC/DC*					
ln(*GDP*)	1	1	1	1	1
S_p	–0.21 (–1.47)	–0.0717 (–1.78)	–0.073 (–1.82)	–0.024 (–4.08)*	–0.0240 (–3.99)*
E	–9.20 (–4.49)*	–1.022 (–8.14)*	–1.27 (-8.17)*	–1.366 (-5.916)*	–1.383 (-5.913)*
PC/DC	9.201 (3.61)*	8.260 (3.39)*	8.028 (3.303)*	0.614 (6.07)*	0.615 (6.04)*
Equation (12), Variables: *E*, *PC/DC*					
E	1	1	1	1	1
PC/DC	–0.0522 (–0.34)	–0.271 (–1.14)	–0.2607 (–1.110)	0.2301 (2.286)*	0.229 (2.285)*
Note: * indicates *t*-statistics significance at 5% level.					

take the words of structuralists, the low coefficients of interest rates for private savings show that the negative effect is somewhat limited and might as well be offset to an extent by the improvement in financial development indicators (e.g., M_2 with a higher coefficient), such that the private savings is sustained at old levels if not improved.

Whereas a sharp decline in private savings right after liberalization needs more explanation than just a sharp rise in interest rates leading to some distortions in the more efficient informal markets. In short, interest rates have caused distortions in some other variables too which are very important for private savings, and which, have been ignored by the structuralists.

One such cause of fall in private savings in Pakistan after liberalization is decrease in retained earnings. There can be two very obvious reasons for retained earnings to fall in Pakistan. Firstly, retained earnings move, if anything, inversely with the rate of interest.[20] As the interest rates rise, the companies decrease the level of their retained earnings on the basis of assessment of future profitability. Secondly, we know from our initial analysis that the overall economy was not doing very good. GDP growth rate, which represents the internal as well as external situations and fiscal as well as monetary performance of the economy, experienced deterioration in 1990s. An overall unstable economic situation of Pakistan might as well have negative impacts on the domestic business firms' revenues, profits and eventually the level of retained earnings.

Coming back to Model (9), financial deepening has a positive long-run relationship with private savings and so does liquidity and capitalization of the stock markets. However, the small coefficients of *TV* and *MC* and insignificant *t*-values of *TV* for three specifications suggest that stock market plays a limited role in determining private savings in Pakistan. This result is as expected because in Pakistan, the stock markets are still developing and investments by a common man constitute a very small part of overall stock market investment.

Model (10) suggests that allocative efficiency has a positive and significant long-run relationship with all the indicators of financial development, except liquidity of stock market, which shows a positive but insignificant relationship. Additionally, very small coefficients of the stock market indicators show the limited role played by the stock market in allocative efficiency of Pakistan. A sharp rise in loan defaults might have contributed significantly to paralyze the productive efficiency of the country. Model (11) states that there is a positive long-run relationship between private savings, productive efficiency and economic growth, while allocative efficiency fails to establish any positive relationship with economic growth. Model (12) shows that allocative efficiency has a negative long-run relationship with productive efficiency. The results of all the three later models suggest that the second leg of MS transmission mechanism has failed to transform financial development into enhanced real macroeconomic activity in Pakistan. The only explanation might be that, no doubt allocative efficiency has improved with financial development, but since there is a perception of two-way causality, worsening of economic conditions on the real front of the economy prevented allocative efficiency to translate into improved investments or improved productive efficiency (i.e., high interest rates are negatively related to productive efficiency). What happened in

[20] The concept of retained earnings is not encouraged much by the proponents of financial liberalization or the later schools. But that cannot take away the importance of this variable in explaining savings or investment patterns of the economy. *See* for more details, Nicholas (2000).

Pakistan was that banks which suffered losses to their capital bases due to financial repression, were tempted to invest in riskier projects in an attempt to quickly recover their losses. The riskier the project is, the higher is the lending rate since the probability of repayment of a loan is negatively related to interest rate charged by the bank. Since Pakistan's macroeconomic conditions were poor, the riskier projects most of the time failed and the borrowers defaulted. As a result, the loan defaults of banks and development finance institutions reached a level of Rs. 128 bn at the end of December 1999—nearly 21% of total advances—from Rs. 25 bn in 1990. The evidence also strongly suggests toward such a possibility. In Pakistan, loan defaults by the private borrowers/investors to the banking sector after liberalization, from 1990 to 1999, have increased at a staggering rate of 500%.

Error Correction and Short-Term Dynamic Analysis

We now move to the analysis of short-term or transitional dynamics. To perform this analysis we study the size and significance of the error correction coefficients. Before presenting the empirical results, it is important to note the connection between cointegration relationship and error correction mechanism. In theory, it is argued that cointegration relationship and error correction mechanism are more or less the same. That is, if two variables are cointegrated with each other, there must be a corresponding legitimate error correction mechanism (Enders, 1993). This connection, however, is based on asymptotic theory. In other words, cointegration relationship implies a legitimate error correction mechanism in large samples. However, if the sample size is small the correspondence between cointegration and error correction can break down.

A sufficient, though not necessary condition for the existence of a legitimate error correction process is that the algebraic signs of error correction coefficients are opposite to the signs of corresponding cointegrating coefficients. That is, the product of each error correction coefficient with the corresponding cointegrating coefficient should be negative. The necessary condition, however, requires that only the sum of these products is negative. It is common to find that the necessary condition is fulfilled, while for some variables the sufficient condition fails. In such a case, the short-run variations in the variables for which the sufficient condition is satisfied are large enough to counter balance the perverse movement in the variables failing the sufficient condition, to produce a net variation in the right direction required for error correction.

The estimated error correction coefficients of the variables under all the cases where cointegrating relationship is found are presented in Table 4. Our results confirm that necessary condition for the existence of a legitimate error correction process is satisfied in most of the cases except for real interest rate and GDP growth. The table shows that the error correction coefficients of real interest rate and GDP growth are statistically insignificant in all cases. This implies that over a period of a year both the variables do not adjust to the long-run equilibrium and they mostly follow their independent path. The theoretical explanation is that after liberalization the inactive response in interest rates were due to sticky expectations and it led to an unprecedented rise in their levels instead of attaining the long-run equilibrium. Whereas GDP growth rate is too broad a concept and its rigidity toward long-run equilibrium is due to the absence of the effects of some more relevant variables.

Table 4: Error Correction Coefficients

Variables	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Equation (9), Variables: S_p, *RDR*, M_2, *TV*, *MC*					
S_p	–1.6017 (–4.74)*	–1.517 (–4.452)*	–1.6209 (–4.5462)*	–0.9526 (–1.8986)**	–1.3926 (–2.012)*
RDR	0.8300 (1.4603)	0.9249 (1.72)	0.9605 (1.633)	1.205 (1.975)**	1.0645 (1.359)
M_2	–0.00101 (–2.2801)*	–0.000548 (–2.156)*	–0.00148 (–2.4228)*	–0.00235 (–2.716)*	0.0020 (–3.4339)*
TV	–0.0138 (–0.8698)	0.00054 (–1.036)	0.0108 (-0.7077)	0.0371 (–3.795)*	0.0258 (–1.8662)**
MC	–1.0264 (–3.7619)*	–1.1652 (–3.9001)*	-1.2459 (-3.885)*	–1.987 (–4.5864)*	–2.6608 (–4.472)*
Equation (10), Variables: *PC/DC*, *RDR*, M_2, *TV*, *MC*					
PC/DC	–1.0259 (–3.3824)*	–1.002 (–3.3455)*	–1.0343 (–3.234)*	–0.7532 (–2.2549)*	–1.182 (–3.777)*
RDR	9.4705 (0.3069)	2.06 (0.391)	2.519 0.386)	3.1842 (0.117)	2.052 (0.663)
M_2	0.2114 (2.125)*	0.2217 (3.084)*	0.2456 (3.368)*	0.0996 (3.6257)*	0.1765 (2.862)*
TV	0.9504 (1.212)	0.8945 (1.125)	0.7827 (1.0356)	1.3802 (2.691)*	0.8308 (1.3009)
MC	5.369 (4.8114)*	9.110 (2.8672)*	8.723 (2.822)*	2.333 (3.332)*	–0.368 (–2.736)*
Equation (11), Variables: ln(*GDP*), S_p, *E*, *PC/DC*					
ln(*GDP*)	–0.0063 (–0.662)	–0.0238 (–1.319)	–0.012 (–0.813)	–0.3843 (–1.602)	–0.375 (–1.4728)
S_p	0.217 (0.4885)	1.2839 (1.575)	1.134 (1.318)	3.973 (2.818)*	2.297 (2.5401)*
E	0.0255 (4.458)*	0.0422 (3.064)*	0.0401 (2.7439)*	0.651 (2.584)*	0.685 (2.6111)*
PC/DC	–0.0073 (–1.215)	–0.02111 (–1.878)**	–0.0264 (-2.5034)*	–0.2204 (–1.048)	–0.228 (–1.022)
Equation (12), Variables: *E*, *PC/DC*					
E	–1.0025 (–2.84)*	–1.016 (–3.094)*	–1.019 (–2.976)*	–1.4481 (–3.268)*	–1.449 (–3.17)*
PC/DC	–0.246 (–0.824)	(–0.076) (–0.2603)	–0.0907 (–0.298)	–0.8235 (–2.388)*	–0.8227 (–2.299)*

Note: * and ** show significance of the *t*-values given in parentheses at 5% and 10% levels respectively.

Causality Tests

As mentioned above, many empirical studies were undertaken in the 1990s to resolve the controversy of the two-way relationship between finance and growth by running causality tests. The earlier time series studies, which employed the Granger causality tests between indicators of financial development and economic growth, reported mixed results (e.g., Odedokun, 1989; Wood, 1993; Arestis and Demetriades, 1997; and Demetriades and Hussein, 1996). The problem with these time series studies was that they ran bivariate causality tests between indicators of financial development and growth variables. It is well known that bivariate tests suffer from omitted variable problems and lead to erroneous causal inferences (Caporael and Pittis, 1995). The theoretical literature on finance and growth postulates financial development to be a positive function of real income and real interest rate. Hence, any causality test between financial development and economic growth which excludes the real interest rate from the system and analyzes only a financial development indicator and an income variable—which is what bivariate studies do—is very likely to be misspecified.

However, our model specifications enable us to run the multivariate causality test because they include interest rates as well as other variables of financial development. This subsection comprises causality tests on different sets of variables in order to understand the direction of the relationship between financial development and real economic activity. Additionally, causality tests will complete the set of information, we require for analyzing the authenticity of the two legs of MS transmission.

In order to empirically test the causality issue it is common to apply Granger causality test (Granger, 1969; and Sims, 1972). Moreover, the cointegration technique introduced by Granger (1986) and Engle and Granger (1987) makes an important contribution toward testing causality. According to this technique, Engle and Granger (1987) demonstrate that once a number of variables (say S_p, RDR, M_2, TV, and MC in Model 5) are found to be cointegrated, there always exists a corresponding error correction representation, which implies that changes in the dependent variables are a function of the level of disequilibrium in the cointegration relationship (captured by the error term) as well as changes in other variable(s). A consequence of cointegration in Model (4) is that either ΔS_p or ΔRDR or ΔM_2 or ΔTV or ΔMC or all of them must be caused by the lagged error correction term which is itself a function of $S_{p_{t-1}}$, RDR_{t-1}, $M_{2_{t-1}}$, TV_{t-1} and MC_{t-1}. Formally, the relationship between S_p, RDR, M_2, TV, and MC in VAR Model (5) can be written in VEC model form as a multiple equation solution (see Appendix for VEC equations of Models (6), (7) and (8) for first difference VARs):

$$\Delta S_{p_t} = \alpha_1 + \sum_{i=1}^{m} \beta_{1i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{1i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{1i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{1i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{1i} \Delta S_{p_{t-i}} + \sum_{i=1}^{p} \partial_{1i} ECM_{r,t-1} + \mu_t \quad ...(13)$$

$$\Delta RDR_t = \alpha_2 + \sum_{i=1}^{m} \beta_{2i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{2i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{2i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{2i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{2i} \Delta S_{p_{t-i}} + \sum_{i=1}^{p} \partial_{2i} ECM_{r,t-1} + \mu_t \quad ...(14)$$

$$\Delta M_{2_t} = \alpha_3 + \sum_{i=1}^{m} \beta_{3i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{3i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{3i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{3i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{3i} \Delta S_{p_{t-i}} + \sum_{i=1}^{p} \partial_{3i} ECM_{r,t-1} + \mu_t \quad ...(15)$$

$$\Delta TV_t = \alpha_4 + \sum_{i=1}^{m} \beta_{4i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{4i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{4i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{4i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{4i} \Delta S_{p_{t-i}} + \sum_{i=1}^{p} \partial_{4i} ECM_{r,t-1} + \mu_t \quad ...(16)$$

$$\Delta MC_t = \alpha_5 + \sum_{i=1}^{m} \beta_{5i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{5i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{5i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{5i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{5i} \Delta S_{p_{t-i}} + \sum_{i=1}^{p} \partial_{5i} ECM_{r,t-1} + \mu_t \quad ...(17)$$

where Δ denotes the first difference of a non-stationary variable.[21] In the VEC framework, we have the opportunity to carry out a multivariate causality test for the multiple pair of variables of interest for each equation by using Wald χ^2 test. For instance, if we are interested to find out the causality between *RDR* and S_p, we will carry out Wald χ^2 test on Equation (13) and will reject the null hypothesis that real deposit rates (*RDR*) do not Granger cause private savings (S_p) if the β_{1i}s are jointly significantly different from zero. Similarly, a reverse causation can be checked for the same pair of variables by carrying out Wald χ^2 test on Equation (14) for the null hypothesis that Ψ_{2i}s are not jointly significantly different from zero.

Tables 5 and 6 respectively show results of multivariate Granger causality tests for VAR Models (5, 6, 7 and 8) at levels and first differences for pair of variables of interest (i.e., we are primarily concerned about the causality between financial development and real economic activity). Since VAR is sensitive to the lag structure, we have reported results based on different lag lengths. Interestingly, both tests at level and first difference produced similar results. However, the study places more emphasis on the results derived at the first difference

[21] The variables without Δ imply that VAR models and its VEC equations are estimated at level in a similar set of equations.

Table 5: Multivariate Granger Causality Test Results Based on Vector Error Correction on Level VAR

H_0: *No causal direction from the variable appearing first to the other variable*					
χ^2-Statistics Based on Wald Test					
Equation (5), Variables: S_p, *RDR*, M_2, *TV*, *MC*					
Pairs of Variables	**k = 1**	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow S_p$	0.027	0.171	1.008	1.303	NRC
$M_2 \rightarrow S_p$	6.563**	25.072*	28.691***	10.784***	NRC
$MC \rightarrow S_p$	6.19**	4.546***	5.97*	2.093	NRC
$TV \rightarrow S_p$	3.27***	1.135	0.13	0.228	NRC
$RDR \rightarrow M_2$	0.015	5.311**	4.78	3.104	RC (at 25%)
Equation (6), Variables: *PC/DC*, *RDR*, M_2, *TV*, *MC*					
Pairs of Variables	**k = 1**	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow PC/DC$	8.37*	14.29*	15.706*	16.917*	NRC
$M_2 \rightarrow PC/DC$	0.098	0.143	0.272	0.237	NRC
$MC \rightarrow PC/DC$	0.008	0.306	0.245	0.153	NRC
$TV \rightarrow PC/DC$	0.5510	0.055	0.046	0.667	NRC
$RDR \rightarrow M_2$	0.666	1.07	2.01	2.87	RC (at 10%)
Equation (7), Variables: ln(*GDP*), S_p, *E*, *PC/DC*					
Pairs of Variables	**k = 1**	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$S_p \rightarrow \ln(GDP)$	0.320	0.454	0.824	1.470	RC (at 1%)
$PC \rightarrow \ln(GDP)$	8.939*	11.414*	22.004*	30.738*	RC (at 1%)
$E \rightarrow \ln(GDP)$	0.322	0.046	1.515	0.717	RC (at 10%)
$S_p \rightarrow PC/DC$	1.494	1.139	4.077	3.72	NRC
$S_p \rightarrow E$	12.64*	13.541*	22.744*	22.092*	NRC
$PC/DC \rightarrow E$	1.24	0.650	0.658	0.366	NRC
Equation (8), Variables: *E*, *PC/DC*					
Pairs of Variables	**k = 1**	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow S_p$	0.07	0.82	0.95	1.10	NRC

Note: *k*: lag length; $\rightarrow$: does not Granger cause; NRC: No Reverse Causation; RC: Reverse Causation; *, ** and *** imply significant at 1%, 5% and 10% levels respectively.

Table 6: Multivariate Granger Causality Test Results Based on Vector Error Correction on First Difference VAR				
H_0: *No causal direction from the variable appearing first to the other variable*				
χ^2-Statistics Based on Wald Test				
Equation (5), Variables: S_p, RDR, M_2, TV, MC				
Pairs of Variables	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow S_p$	4.21	15.02**	13.76	RC (at 25%)
$M_2 \rightarrow S_p$	7.34**	22.19*	28.73*	NRC
$MC \rightarrow S_p$	4.29****	6.03***	8.48***	NRC
$TV \rightarrow S_p$	3.94****	3.09	7.92***	NRC
$RDR \rightarrow M_2$	8.12**	5.30****	6.86****	RC (at 10%)
Equation (6), Variables: PC/DC, RDR, M_2, TV, MC				
Pairs of Variables	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow PC/DC$	14.17*	14.82*	11.68**	NRC
$M_2 \rightarrow PC/DC$	9.36**	16.63*	20.09*	NRC
$MC \rightarrow PC/DC$	0.52	1.08	0.74	NRC
$TV \rightarrow PC/DC$	0.90	0.20	0.21	NRC
$RDR \rightarrow M_2$	3.48	6.07***	6.41***	RC (at 25%)
Equation (7), Variables: ln(GDP), S_p, E, PC/DC				
Pairs of Variables	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$S_p \rightarrow \ln(GDP)$	12.45*	15.88*	30.44*	RC (at 1%)
$PC \rightarrow \ln(GDP)$	6.16***	7.04***	10.61**	RC (at 1%)
$E \rightarrow \ln(GDP)$	0.917	1.476	2.240	RC (at 10%)
$S_p \rightarrow PC/DC$	0.90	0.77	0.39	NRC
$S_p \rightarrow E$	7.36**	16.87*	21.99*	NRC
$PC/DC \rightarrow E$	2.04	2.81	11.68***	NRC
Equation (8), Variables: E, PC/DC				
Pairs of Variables	**k = 2**	**k = 3**	**k = 4**	**Other Observation**
$RDR \rightarrow S_p$	5.59****	5.26	6.53****	NRC

Note: k: lag length; $\rightarrow$: does not Granger cause; NRC: No Reverse Causation; RC: Reverse Causation; *, ** and *** imply significant at 1%, 5% and 10% levels respectively.

because all variable pairs shown in both the tables are integrated of order one, and have cointegrating vectors between them as well. The test detects a causal relation running from real interest rate to the private savings at first difference for Equation (5). But at level there is no statistical support for the causal direction. Between both the variables the causation seems bidirectional. However, the statistical significance of bidirectional causation is very weak. Since we know from the previous section that there is a negative long-run relationship between this pair, we can strongly suggest that after liberalization, increase in interest rates have had a negative impact on private savings. Model (5) also supports causal influence from financial deepening, stock market liquidity and capitalization to private savings. This is consistent with the MS thesis. Another interesting finding from Model (5) is the two-way causation between interest rate and financial deepening. This indicates that an OLS estimation of the model would suffer from the problem of multicollinearity, thus establishing the superiority of cointegration analysis.

Model (6) shows that interest rate significantly causes allocative efficiency both at level and first difference VAR. Financial deepening has a causal influence on allocative efficiency only at first difference VAR. However, no causal relationship whatsoever is found between stock market liquidity, capitalization and allocative efficiency. Once again a two-way causation is obtained between financial deepening and interest rates.

Model (7) suggests that there is a one-way causation and two-way causation between economic growth and private savings at level and first difference VAR respectively. As mentioned above, we shall give more importance to the result obtained at first difference VAR. This consideration puts some additional light on the fall in private savings. As we know that economic growth fell after liberalization, mainly due to political and economic instability, this negative impact was transferred to the levels of private savings as well. There might be several channels through which low growth might have affected the private savings. As said before, one such channel is retained earnings, which succumbed due to drop in the revenues or output of the firms. A reverse causation is found between productive efficiency and economic growth, whereas allocative efficiency has a causal influence on productive efficiency at first difference VAR. These results are consistent with the results given in Table 3, where we had explained why allocative efficiency, although improved by financial development after liberalization, failed to improve real economic activity.

Conclusion

The paper tested the validity of the MS thesis in the case of Pakistan, by identifying two distinct parts of the MS transmission mechanism, through which financial development is argued to lead to improvements in real economic activity. The two components identified were private savings and allocative efficiency. These two components were combined with the financial variables in two separate models, to test the full MS transmission mechanism.

In order to check two-way causality between financial and real variables, we extended our empirical study to a cointegration analysis. Besides, cointegration was also undertaken in order to address certain empirical issues faced by our basic models. We developed four VAR models to start with. The first two models were the two legs of MS transmission mechanism. The later two models showed the relationship of the end variables of the transmission with GDP growth and productive efficiency. This was done to understand more properly the effects of transmission mechanism on real activity. In addition to this the models were also very useful in analyzing the path of causality, whether it is going to be two-way or not. Cointegration tests on these VAR models enabled us to establish and know the nature of relationship between the financial and real variables, while multivariate causality tests on the VEC equations of each VAR model revealed the direction of this established relationship.

Our results indicate that financial deepening experienced in the banking sector, and liquidity and capitalization of stock market have positive impact on private savings. However, very low coefficients of secondary market development indicators show the limited role of stock market in real economic activity of the country. This result is somewhat expected because though Karachi Stock Exchange (KSE), was opened to the foreign investors in 1990, it is still in its primary stages of development; to-date the majority of the participants in KSE are financial institutions, whereas private and individual stock holdings are limited. Estimates of the first model further show a negative relationship between interest rates and private savings. This result is contradictory to MS thesis and refers to the criticism of the structuralists, who suggest that a sudden and sharp rise in interest rates after liberalization is harmful for real activity. Nevertheless, a small size of the coefficient of interest rate suggests that this distortion is not big enough to be the sole reason for hampering private savings to the extent that the improvements in different financial development indicators were completely offset, so that the savings faced a steep decline in the 1990s. It seems that there are other factors, that have played a vital role in hampering private savings. A poor economic performance must have caused a fall in profits/retained earnings of firms, and since they are significant components of private savings, it fell in response. So from our point of view, fall in retained earnings is one of the key factors which explains the fall in private savings. However, data limitations restricted us from obtaining the empirical validation for our argument.

We received no contradictory results in the estimation of the second leg of MS transmission mechanism. Financial development and rise in interest rates have significantly improved the allocative efficiency of the financial sector. It appears that this leg also failed to achieve its end objective of improving the real economic activity. The justification for failure of the second leg of MS thesis was attained through a multivariate causality analysis which confirmed that there is a two-way causality between financial development and economic activity and any progress in financial front was offset by the worsening macroeconomic situation of the country.

Contribution of the Study to Existing Literature: The main contributions of this study are as follows: First, there is a conspicuous lack of multivariate time series tests of causality between financial development and economic growth in the literature. This study contributes to fill this gap. In doing so, it addresses the misspecification problem inherent in the existing bivariate studies. This paper addresses the concern raised about the cross-country results by providing evidence based on time series analysis since a great deal of skepticism in relation to cross-country regressions is shared by many investigators and the sensitivity of the results is acknowledged by the users of the technique themselves (Levine and Renelt, 1992; and Levine and Zervos, 1996). Second, the paper identifies and reports the long-run financial development and output vectors, which reveal the strength of relationship between financial development and its determinants, viz., aggregate private savings, allocative efficiency, GDP growth rate, and productive efficiency. Finally, it follows a systems approach (i.e., two legs of MS thesis) that eliminates the single equation bias that may have affected the previous studies.

Policy Implications: The study appears to contradict the MS thesis in the case of Pakistan in many respects. In the light of the results, the following imperative policy implications may be made: The timing of the policy implementation is very important in this case.[22] It is more important to introduce reforms in the real sector, instead of undertaking reforms in all the sectors of the economy. However, when the real sector is developed enough, liberalizing capital markets can supplement the growth momentum the economy has already achieved. ❖

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[22] This point has also been realized by McKinnon in his later study on Southern Cone countries (McKinnon, 1989).

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Appendix

Subsequent VEC Equations

VAR Model (6)

$$\Delta(PC/DC)_t = \alpha_6 + \sum_{i=1}^{m} \beta_{6i}\Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{6i}\Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{6i}\Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{6i}\Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{6i}\Delta(PC/DC)_{t-i} + \sum_{i=1}^{p} \partial_{6i} ECM_{r,t-1} + \mu_t \quad \text{...(A.1)}$$

$$\Delta RDR_t = \alpha_7 + \sum_{i=1}^{m} \beta_{7i}\Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{7i}\Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{7i}\Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{7i}\Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{7i}\Delta(PC/DC)_{t-i} + \sum_{i=1}^{p} \partial_{7i} ECM_{r,t-1} + \mu_t \quad \text{...(A.2)}$$

$$\Delta M_{2_t} = \alpha_8 + \sum_{i=1}^{m} \beta_{8i}\Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{8i}\Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{8i}\Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{8i}\Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{8i}\Delta(PC/DC)_{t-i} + \sum_{i=1}^{p} \partial_{8i} ECM_{r,t-1} + \mu_t \quad \text{...(A.3)}$$

Appendix (Cont.)

$$\Delta TV_t = \alpha_9 + \sum_{i=1}^{m} \beta_{9i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{9i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{9i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{9i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{9i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{p} \partial_{9i} ECM_{r,t-1} + \mu_t \quad ...(A.4)$$

$$\Delta MC_t = \alpha_{10} + \sum_{i=1}^{m} \beta_{10i} \Delta RDR_{t-i} + \sum_{i=1}^{n} \delta_{10i} \Delta M_{2_{t-i}} + \sum_{i=1}^{k} \gamma_{10i} \Delta TV_{t-i} + \sum_{i=1}^{j} \lambda_{10i} \Delta MC_{t-i} + \sum_{i=1}^{h} \Psi_{10i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{p} \partial_{10i} ECM_{r,t-1} + \mu_t \quad ...(A.5)$$

VAR Model (7)

$$\Delta GDP_t = \alpha_{11} + \sum_{i=1}^{m} \beta_{11i} \Delta S_{p_{t-i}} + \sum_{i=1}^{n} \delta_{11i} \Delta E_{t-i} + \sum_{i=1}^{k} \gamma_{11i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{j} \lambda_{11i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \partial_{11i} ECM_{r,t-1} + \mu_t \quad ...(A.6)$$

$$\Delta S_{p_t} = \alpha_{12} + \sum_{i=1}^{m} \beta_{12i} \Delta S_{p_{t-i}} + \sum_{i=1}^{n} \delta_{12i} \Delta E_{t-i} + \sum_{i=1}^{k} \gamma_{12i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{j} \lambda_{12i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \partial_{12i} ECM_{r,t-1} + \mu_t \quad ...(A.7)$$

$$\Delta E_t = \alpha_{13} + \sum_{i=1}^{m} \beta_{13i} \Delta S_{p_{t-i}} + \sum_{i=1}^{n} \delta_{13i} \Delta E_{t-i} + \sum_{i=1}^{k} \gamma_{13i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{j} \lambda_{13i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \partial_{13i} ECM_{r,t-1} + \mu_t \quad ...(A.8)$$

$$\Delta (PC/DC)_t = \alpha_{14} + \sum_{i=1}^{m} \beta_{14i} \Delta S_{p_{t-i}} + \sum_{i=1}^{n} \delta_{14i} \Delta E_{t-i} + \sum_{i=1}^{k} \gamma_{14i} \Delta (PC/DC)_{t-i} + \sum_{i=1}^{j} \lambda_{14i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \partial_{14i} ECM_{r,t-1} + \mu_t \quad ...(A.9)$$

Appendix (Cont.)

VAR Model (8)
$\Delta E_t = \alpha_{15} + \sum_{i=1}^{m} \beta_{15i} \Delta(PC/DC)_{t-i} + \sum_{i=1}^{n} \delta_{15i} \Delta E_{t-i} + \sum_{i=1}^{p} \partial_{15i} ECM_{r,t-1} + \mu_t$ ...(A.10)
$\Delta(PC/DC)_t = \alpha_{16} + \sum_{i=1}^{m} \beta_{16i} \Delta(PC/DC)_{t-i} + \sum_{i=1}^{n} \delta_{16i} \Delta E_{t-i} + \sum_{i=1}^{p} \partial_{16i} ECM_{r,t-1} + \mu_t$ ...(A.11)

Reference # 42J-2010-12-01-01