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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Financial market and growth: Evidence from post-reforms Indiaⁱ

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Abstract: A significant boom occurred in the Indian financial market and growth in the post-liberalization era. This motivates us to analyze the impact of stock market and credit market (two components of financial market) for the growth of financial market. This paper attempts to show the linkage between stock and credit markets and their impact on the Indian economy taking the period after post-liberalization. The period of analysis is from 1994 to 2010; we identify the three variables as stationary and find a relationship between the financial market and gross domestic product (GDP) and a long-run effect of lagged differences in credit market on GDP. It has been inferred that stock market development has larger and more significant long-run mutual effects on economic growth than credit market development in India.

Subjects: Credit & Credit Institutions; Development Economics; Economic Forecasting; Investment & Securities

Keywords: finance; India; reforms; stock markets; credit markets; time-series analysis

1. Introduction

Financial sector plays a crucial role in the accumulation of capital and the production of goods and services. In many developing nations, limited financial markets, instruments, and financial institutions, as well as poorly defined legal systems, may make it costlier to raise capital and may lower the return on savings or investments. They also help to facilitate the international flow of funds between countries. The banking sector and the capital markets are assumed to be the primary constituents of the financial sector. This study assumes relevance in the context of a fast-growing economy such

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Prity Sinha is an independent researcher currently. She completed her MSc in Economics from Madras School of Economics, Chennai, India. This paper was initially pursued for her dissertation and then modified for this submission.

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PUBLIC INTEREST STATEMENT

Stock markets, credit markets, and real economic growth are inter-dependent in general. However, there is not much literature that focuses on how they are related to each other. We focus on this aspect in India. Further, we delve into non-agricultural sectors, to avoid the complexities involved in agricultural sector affecting our central question. We find that stock markets are more important than credit markets for non-agricultural economic growth.

as of India that has taken several reform measures and continues to do so to enhance the role of financial sector in the economic development and better regulation so that markets are efficient.

The appointment of the Narasimhan Committee in 1991 set the guidelines that provided several measures for reforms in the banking sector and the capital market. The prominent reforms in the banking sector resulted in the deregulation of interest rates particularly, in term deposits and reduction in the cash reserve ratio (CRR) from 25 to 6% and statutory liquidity ratio (SLR) from 40 to 25% from the 1990s to the mid 2000s. To enhance competition, a number of foreign and private banks were allowed to perform commercial banking and also foreign direct investment was allowed up to 74%. The banks were also allowed to access the capital markets to raise additional funds.

The reforms in the capital markets involved removal of prior approval of the government to access capital market, an apex regulator Securities and Exchange Board of India (SEBI) was formed in 1992 which would focus on regulating the capital markets and set the rules for it. Foreign institutional investors were allowed to invest in India and the Indian firms were allowed to access foreign markets to raise capital. Electronic trading was introduced with the setting up of a competitive exchange called as the National Stock Exchange (NSE) alongside the older Bombay Stock Exchange (BSE). The Indian stock markets till 1991 have remained stagnant due to the rigid economic controls. After liberalization process, the Indian securities market witnessed a flurry of Initial Public Offerings (IPOs). The market saw many new companies spanning across different industry segments and business to access the capital markets and register themselves in BSE/NSE.

Ahead this backdrop, it is interesting and relevant to understand the linkages between the banking sector, capital markets, and economic growth in India. The studies that exist in the Indian context (Chakrabarty, 2013; Pradhan, 2011) provide contradictory evidence on the relevance of the stock market on economic growth. This study probes into the same aspect but with a different set of variables to further understand the nature of relationship between financial sector and economic growth in the Indian context particularly after 1991.

The paper is organized as follows: Section 2 is a brief overview of theoretical studies and empirical evidence relevant to this study and Section 3 mentions the objective of this study. Data used in this study and methodological issues are discussed in Section 4, while Section 5 provides the empirical results and the main findings of the study with the final Section 6 providing the conclusion for this study.

2. Overview of literature

In the early 1990s, several theoretical models provided contradictory conclusions on the relevance of the financial intermediaries for promoting long-run growth (Greenwood & Jovanovic, 1990; Saint-Paul, 1992). Prior to this there had already been discussions on whether stock markets and banks act as substitutes or complements of each other (see, Boyd & Prescott, 1986; Stiglitz, 1985). This led to a series of empirical analyses trying to explore the contribution of capital markets and banks to the economic growth. These studies were based on panel data for a large number of countries and the results have been rather mixed. Few studies provide evidence that both stock markets and financial sector have strong influence on economic growth as provided in a detailed discussion in Chakrabarty (2013) on this issue. The nature of the sample, whether it is for developed or developing countries as well as whether it is a time-series data or panel data seems to also influence the empirical findings. In some instances, the results were in favor of unidirectional causality between financial sector and economic growth (Christopoulos & Tsionas, 2004), while in others like Apergis, Filippidis, and Economidou (2007) there was a bidirectional causality between financial depth and economic growth.

Many studies exist that explore the linkages for developing countries in Latin America while relatively few studies focus on Asia and even fewer on India (Chakrabarty, 2013; Pradhan, 2011). The studies in the Indian context are important and interesting as India embarked on economic policy

reforms in 1991 and a major part of these reforms was linked to the financial system. Apart from these, there were a slew of reforms in the industrial sector and trade sector. All of these led to a major spurt in the growth of the Indian economy which surged forward from the Hindu growth rate of about 3–4% per annum to about 7–8% in the 2000s and touched 9% in recent years. Though there has been a decline in the growth rates for India since 2009, it is still among one of the fastest growing regions of the world.

Pradhan (2011) based on monthly data finds that there exists a long-run relationship between stock market development (proxied by market capitalization) and financial development (captured by broad money supply as a proportion of gross domestic product [GDP]) that are important determinants of economic development (proxied by Index of Industrial Production [IIP]) for the period between 1994 and 2010. In the Granger sense of causality, the study further reports that there is a bidirectional relationship between economic development and financial development, while economic development influences stock market development in a unidirectional sense. No causal relationship was observed between stock market and financial development. Firstly, the analysis does not provide adequate economic intuition on the choice of variables for the analysis in particular, on why IIP was used as a measure of economic development and why the ratio of broad money to GDP was used as a measure of financial development. Secondly, the paper also provides no discussion on the type of results obtained.

In comparison to this, Chakrabarty (2013) provides a theoretical framework within which the empirical model is embedded. Clearly, the nature of variables used in the model though with similar econometric technique shows based on quarterly data that for the period 1993–2005, stock market development makes no significant contribution while the reforms in the banking sector, particularly those related to interest rate deregulation plays a significant role in the economic growth.

Firms would depend on both capital market (for equity) and credit market (for debt) for capital. There are several studies in India in this context that have tried to understand the determinants of variations in debt-equity ratio across firms (Guha-Khasnobis & Bhaduri, 2002). Similarly, households also invest in equity market and in banks which are also a source of formal sector credit for them. Hence, these different sources of supply of domestic capital try to meet the different sources of demand for capital. Apart from these sources of finance, international financial flows also play a major role in meeting the demand for capital in the form of foreign direct investment, migrant remittances, and overseas development assistance. From this perspective, it is useful to understand the nature of interrelationship between stock market, credit market, and economic development.

3. Objective

One observes, based on these two recent studies for post-reform India, that the results are not very conclusive on the direction and the strength of linkage between stock market development, financial development, and economic development. There is a paucity of empirical studies on the exploration of the linkage between stock market and credit market and this study tries to consider this using a different choice of variables. Firstly, this study uses the non-food bank credit as variable to capture the flow of capital, level of stock market activity captured by the stock index, and the level of non-agricultural GDP as a measure of economic development to further probe into the mentioned objective. The next section discusses the data and methodology.

4. Data and methodology

The data-set covers the period from 1994 to 2010 with all variables in constant prices (2004–2005) that are annual in nature and in logarithmic form. The data are from the Handbook of Statistics, Reserve Bank of India (2013). In this study, the analysis consists of three variables that would allow us to link between financial market activities and credit market activities and are described below:

- (1) Non-food bank credit (lnfcr, henceforth): This variable primarily captures the credit given by banks to the non-food sector. The intention of using non-food sector credit was to include all

the formal sector credit that would be used for industrial activities including those agricultural activities that would involve processing.

- (2) S&P CNX NIFTY (lnifty, henceforth): This index reflects the level of stock market activity in the economy or on aspect of financial development. The values are annualized average of the monthly index values as reported by RBI.
- (3) Non-agricultural GDP (lnagdp, henceforth): Since the firms in the industrial and service sectors primarily depend upon the financial market for equity and the firm's valuation, value addition from non-agricultural activities, that is GDP from non-agricultural activities, is included in the analysis. It may be noted that wherever processing activities are involved as for commercial crops, horticulture, and allied activities of agriculture like poultry, livestock, etc. they form a part of industrial activities.

The econometric analysis is based on estimating a vector autoregression (VAR) model that allows us to study the inter-relationships between the variables. If there is true simultaneity among a set of variables, they should all be treated on an equal footing; there should not be any prior distinction between endogenous and exogenous variables. So based on this assumption, the VAR Model is used with these sets of variables. In other words, the VAR model is a multi-variable-multiple-equation model that allows each variable in the model to be determined not only by its own past values but also by past values of the other variables. Thus, a system of VAR equations will consist of as many equations as there are variables in the model (which is three in this study) while the number of lags is determined by statistically testing for the best fitting model. The three equation model with p -lags is specified below:

$$Y_t = m + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

where $Y_t = (Y_{1t} \ Y_{2t} \ Y_{3t})'$ is a three vector variable with $Y_{1t} = \ln fcr$, $Y_{2t} = \ln nifty$, $Y_{3t} = \ln agdp$; m is the 3×1 vector of intercepts, one for each equation; A_k is the 3×3 matrix of coefficients associated with the k th lag of the variable i.e. Y_{t-k} ; p is the total number of lags that is empirically determined and is dependent on the sample so that the residual term (ε_t) is a white noise (pure random) process after the right lag length is "chosen"; $\varepsilon_t = (\varepsilon_{1t} \ \varepsilon_{2t} \ \varepsilon_{3t})'$ with ε_{3t} being the residual in the i th equation, $i = 1, 2, 3$.

The first step in the VAR analysis is to determine whether the VAR equations are stable or not. The issue of stability arises due to the fact that some or all of the variables in the VAR could be non-stationary that is, a (univariate) time-series does not revert to its long-run mean value. In such a case, the stability of the VAR systems depends on the presence of at least one linear combination that is stationary. That is, if there exists at least one cointegrating relationship, then we can estimate the VAR model in the above form. To test for the stability of VAR, we use the trace test and the max test by testing that the rank of matrix Π in the following respecification is not zero (Johnston & DiNardo, 1997, pp. 294–295).

$$\Delta Y = m + B_1 \Delta Y_{t-1} + B_2 \Delta Y_{t-2} + \dots + B_p \Delta Y_{t-p} - \Pi Y_{t-1} + \varepsilon_t \quad (2)$$

Here B 's are functions of A and $\Pi = (I - A_1 - A_2 - \dots - A_p)$. The stability or the behavior of the Y vector depends on the roots of the values of the λ (roots) that solve the equation:

$$\left| \lambda^p I - \lambda^{p-1} A_1 - \lambda^{p-2} A_2 - \dots - A_p \right| = 0 \quad (3)$$

Ruling our explosive roots, the following three cases arise:

- (i) Rank (Π) = 3, (total variables in the system). In this case, the modulus of all the roots (λ s) will have values less than 1, so that Π is of full rank and non-singular. In this case, all the Y variables are stationary. Each of the equations in the system is estimated using ordinary least squares (OLS).

- (ii) $0 < \text{Rank}(\mathbf{\Pi}) < 3$: In this case, either 1 or two roots are less than one in modulus so that the $\mathbf{\Pi}$ is not of full rank but of order k ($=1$ or 2 here) and can be expressed as $\mathbf{\Pi} = \alpha\beta'$, where each of these is a $3 \times r$ matrix. β is referred as the matrix of cointegrating vectors and α is referred as the matrix of adjustment parameters giving the speed of adjustment to the long-run mean.
- (iii) $\text{Rank}(\mathbf{\Pi}) = 0$, is a rare case and happens when all the roots are equal to one. In this case, the VAR should be specified solely in terms of the first difference of the variables and not as in Equation 1 above.

The cointegrating rank can be found by the following two tests:

- (i) Trace test: Here the test is performed in a sequential manner starting from the first test of $H_0: r = 0$ against the alternative hypothesis of $H_1: r > 0$. If the null is rejected then $H_0: r = 1$ against the alternative hypothesis of $H_1: r > 1$ and so on until the null hypothesis of $H_0: r = k$ is reached. The test statistic is: $\lambda_{trace} = -T \sum_{t=r+1}^k \ln(1 - \hat{\phi}_t)^2$, where $\hat{\phi}_t$ are the $T-r$ smallest eigen values estimated from the model with sample size T . The rejection of the null indicates the presence of at most r cointegrating vectors.
- (ii) Max test: Here the null hypothesis of r cointegrating vectors is tested against $r + 1$ cointegrating vectors with $r = 0, 1, 2$. The test statistic is $\lambda_{max} = -T \ln(1 - \hat{\phi}_{r+1})$.

Both these test statistics have a non-standard distribution. Johansen and Juselius (1990) provide critical values for the two statistics.

This method to test for the stability of the system of equations is referred as Johansen's method and is a maximum-likelihood method that determines the number of co-integrating vectors in a non-stationary time series vector autoregression (VAR) model. These tests for cointegration are sensitive to the choice of lag length in the VAR model, so we first determine the value of "p" before performing the test for stability of VAR.

Determination of lag-length: In determining lag lengths for the Johansen's procedure, we chose between using Akaike's (AIC) and the Schwarz's Bayesian (SBIC) information criterion processes. The SBIC is usually more consistent but inefficient, while AIC is not as consistent but is usually more efficient. SBIC will usually give a larger average variation in the selected model orders between these three different sample periods within the same population and AIC is known to avoid this situation, therefore our study prefers to use AIC over SBIC in determining lag lengths.

5. Results

A graphical representation of the three variables in Figure 1 shows upward trending variables, thereby indicating the possibility of a unit root in all the three variables. Non-food bank credit excluding agriculture, annual average of S&P CNX Nifty, and non-agricultural GDP (i.e. GDP at factor cost of industry & service sector) increase from 1993 to 2010; this gives an indication of a positive impact of liberalization of financial market (Table 1).

In all the results in this paper, we found that only the specification with one lag has the least AIC and SBIC value, mainly because our data-set is quite small. Our results of augmented Dickey-Fuller test show the following:

- (1) Non-food bank credit excluding agriculture is a stationary variable, with no unit root, at all levels of significance, since its t -statistic (12.715) is far greater than the 10% critical value of -6.21 .
- (2) Annual average of S&P CNX Nifty is also a stationary variable, with no unit root, at 10% level of significance, since its t -statistic (1.806) is greater than the 10% critical value of -6.21 , implying a p -value of 0.09.
- (3) Non-Agricultural GDP is stationary as well at all levels (t -statistic: 20.55).

Figure 1. Trends in variables used in the model.

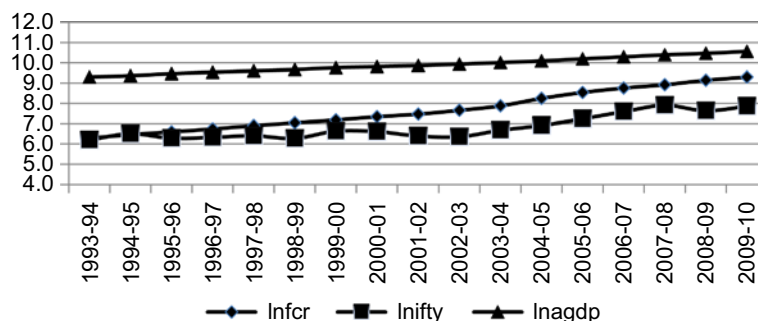


Table 1. Summary of the data-set

Year	In non-food bank credit	In non-food bank credit (Excluding agriculture)	In average S&P CNX nifty	In non-agricultural GDP
1993-1994	6.289	5.789	6.194	9.295
1994-1995	6.464	5.996	6.502	9.363
1995-1996	6.598	6.137	6.282	9.464
1996-1997	6.744	6.281	6.323	9.532
1997-1998	6.903	6.471	6.401	9.600
1998-1999	7.044	6.620	6.273	9.666
1999-2000	7.184	6.774	6.631	9.755
2000-2001	7.342	6.932	6.607	9.809
2001-2002	7.469	7.043	6.391	9.862
2002-2003	7.657	7.230	6.353	9.930
2003-2004	7.878	7.458	6.673	10.005
2004-2005	8.247	7.849	6.908	10.088
2005-2006	8.538	8.122	7.239	10.188
2006-2007	8.758	8.308	7.590	10.291
2007-2008	8.920	8.461	7.906	10.386
2008-2009	9.140	8.689	7.634	10.464
2009-2010	9.299	8.819	7.856	10.557

Source: RBI (Handbook of statistic on Indian Economy-2013).

Though all the three variables are stationary, we still examine the existence of cointegration among them. Results of Johansen Cointegration test have been summarized in Table 2. Since the trace-statistic is less than the critical value when rank = 1 and greater than the critical value when

Table 2. Results of Johansen cointegration test

Johansen tests for cointegration							
Maximum rank	Parms	LL	Eigenvalue	Trace statistic	Maximum statistic	5% Critical value	
						Trace statistic	Maximum statistic
0	9	69.25	-	43.04	33.31	24.31	17.89
1	14	85.91	0.89	9.73*	9.73	12.53	11.44
2	17	90.78	0.47	0.00	0.00	3.84	3.84
3	18	90.78	0.00				

Notes: Trend: none; Sample: 1996-2010; Number of observations = 15; Lags = 2.

*Level of significance at 5%.

Table 3. Results for VAR model

Equation	Parms		RMSE	R ²	F	P > F
NBC_agri	4		0.06	1.00	1301.76	0
avg_S&P	4		0.15	0.95	71.71	0
gdp_ind&svr	4		0.01	1.00	7525.52	0
	Coef.	Std. Err.	t	P > t	[95% Conf.	Interval]
NBC_agri						
NBC_agri						
L1.	1.25	0.21	5.94	0.00	0.79	1.70
avg_S&P						
L1.	-0.14	0.08	-1.88	0.08	-0.31	0.02
gdp_ind&svr						
L1.	-0.36	0.47	-0.76	0.46	-1.39	0.67
_cons	2.82	3.36	0.84	0.42	-4.50	10.15
avg_S&P						
NBC_agri						
L1.	2.14	0.55	3.90	0.00	0.94	3.33
avg_S&P						
L1.	0.17	0.20	0.85	0.41	-0.26	0.60
gdp_ind&svr						
L1.	-4.14	1.24	-3.35	0.01	-6.84	-1.45
_cons	30.40	8.78	3.46	0.01	11.26	49.54
gdp_ind&svr						
NBC_agri						
L1.	0.16	0.03	4.81	0.00	0.09	0.24
avg_S&P						
L1.	-0.03	0.01	-2.05	0.06	-0.05	0.00
gdp_ind&svr						
L1.	0.64	0.08	8.31	0.00	0.47	0.81
_cons	2.57	0.55	4.70	0.00	1.38	3.76
Equation	Excluded	F	df	df_r	Prob > F	
NBC_agri	avg_S&P	3.55	1	12	0.08	
NBC_agri	gdp_ind&svr	0.57	1	12	0.46	
NBC_agri	All	1.80	2	12	0.20	
avg_S&P	NBC_agri	15.18	1	12	0.0021	
avg_S&P	gdp_ind&svr	11.25	1	12	0.0057	
avg_S&P	All	10.84	2	12	0.0020	
gdp_ind&svr	NBC_agri	23.12	1	12	0.0004	
gdp_ind&svr	avg_S&P	4.18	1	12	0.0633	
gdp_ind&svr	All	12.46	2	12	0.0012	

Notes: Sample: 1995–2010; Number of observations = 16; Log likelihood = 88.86; AIC: > -9.61; FPE = 1.39e-08; HQIC: > -9.58; Det(Sigma_ml) = 3.01e-09; and SBIC: > -9.03.

rank = 0, we conclude that there is one co-integrating relationship among the variables considered herein. We find this result from Johansen’s cointegrating test somewhat puzzling as the rank should be 3 given that all the variables using unit root test show stationarity and go ahead with the stationarity results.

Thus, we estimate a VAR model, whose results are shown in Table 3, summarized as follows:

- (1) Non-food bank credit excluding agriculture is positively and significantly affected by its own lagged difference.
- (2) Annual average of S&P CNX Nifty is affected positively and significantly by its own lag and quite immensely positively and significantly affected by the lagged difference of non-agricultural GDP.
- (3) Non-agricultural GDP is significantly affected by the lagged differences of the other two variables. The negative effect of stock market on GDP is surprising, although the effect is pretty small.

In short, we find that there is a long-run relationship between the financial market and GDP, but there is no such significant long-run relationship between the credit market and GDP. On the other hand, it is interesting to note the GDP does adjust in the long run to changes in credit market.

6. Conclusions

The objective of this paper was to show the linkage between stock market, non-agricultural credit market, and non-agricultural GDP. In other words, we attempted to understand how these variables have contributed toward the growth of an economy in relation to the financial market. Using various time-series tools, we conclude that there is a long-run relationship between financial market and GDP, while the latter is also affected in the long run by changes in credit market.

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Note

(i) A first draft of this paper was the MSc dissertation of Prity Sinha, at Madras School of Economics (MSE).

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