SOURCES OF SYSTEMATIC RISKS IN INDIAN BANKING STOCK RETURNS - SOME EMPIRICAL EVIDENCES

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This paper examines the relationship between various macroeconomic variables and banking stock returns in order to find out significant sources of systematic risks in banking stock returns in India. Monthly data for the period 2002-2014 (further divided into a pre crisis and a post crisis period) has been analysed using unit root test, correlation, regression, Granger causality (both short and long run) and cointegration tests. Results reveal that exchange rate, market factor and long term interest rate are significant in explaining banking stock returns in India in total and post crisis periods (with R^2 being 82% and 87% respectively). Short run causality results reveal unidirectional causality from long run interest rate to banking stock returns and from banking stock returns to market returns. On the other hand, long run causality results reveal that inflation and money supply Granger cause bankex while bankex Granger causes IIP and short term interest rate. Hence, there seem to be a lead lag relationship between banking stock returns and various macroeconomic sources of risks. We found long run cointegration of banking stock returns with money supply and short run interest rate. These results provide support to the argument that besides market risk, interest rate risk and currency risk are also priced in banking stock returns. These findings are pertinent for policy makers, regulators and investors at large.

Key words: Systematic Risks, Banking Stock Returns, Short and Long Run Causality, Cointegration.

INTRODUCTION

Banking sector is a very important constituent of financial sector of a country and is considered to play a vital role in its overall economic growth and development by channelizing scarce financial resources from fund surplus to the fund deprived sections of the economy. Banks operate in a financial environment which is becoming

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increasingly complex and unpredictable. As such, they are exposed to many risks at firm, industry and macro level. Due to the intrinsic relationship between financial and real sectors, banks are not insulated from the impact of macro or systematic risk factors. In fact, it is argued that banks being the life blood of overall financial system are even more sensitive to systematic risks than their counterparts in other sectors. The impact of these systematic risk factors on banks can be gauged to a large extent from their effect on banking stock returns.

Theory, literature and past experience suggests that out of several systematic risk factors which impact banking stock returns; equity or market risk, interest rate risk, foreign exchange rate risk, liquidity risk, commodity risk and economic risk are prominent. Macroeconomic variables such as benchmark Stock Market index, Interest rate, Exchange rate, Money supply, Inflation and Index of Industrial Production are normally taken as proxies for equity risk, interest rate risk, foreign exchange rate risk, liquidity risk, commodity price risk and economic risk respectively.

CAPM (Capital Asset Pricing Model) suggests that individual security returns include market risk premium, so both should be positively related and should move together in the long run. So, market and banking stock returns should have significant positive relationship.

Interest rates are usually accepted as having a negative impact on banking stock returns because an increase in it increases cost of funds (by raising the opportunity cost of investors) and reduces demand for loans and advances. However, some argue that interest rate changes may have a positive impact on banking stocks if rise in lending rate is more than the rise in cost of funds.

Increasing internationalization of banks businesses, foreign currency exposures both in terms of lending and borrowing, and imperfect hedging against foreign exchange risk make foreign exchange rate risk an important systematic risk factor impacting banking stock returns. However, the nature of impact would depend on the net foreign currency position of banks.

Liquidity is also a very significant component of systematic risks, particularly in case of financial institutions like banks. Generally, if other things remain same, a higher liquidity in the system should improve banking stock returns and a liquidity crunch can have drastic negative effects as evident from recent global financial crisis of 2007-08.

Commodity price risk is essentially the inflation risk in the economy. During inflation, purchasing power of money declines, aggregate demand suffers and investors demand a higher return to compensate for inflation risk. Also, inflation targeting policies of central banks would result in more discomfort for banks through decrease in liquidity and rise in interest rates.

General economic risk is associated with the pace of changes (growth or decline) in aggregate economic activity. Banks being integral part of financial system and overall economy are impacted by it. Favourable economic scenario has a positive effect on banking stock returns.

The recent global crisis of 2007-08 was essentially a breakdown of financial system. Its influence was perceived around the world and many countries especially European Union and Japan are yet to fully recover from its aftermath. Financial institutions particularly banks were worst hit evident from collapse and subsequent restructuring of prominent banks like Lehman Brothers. Thus, it would also be intriguing to explore whether there was any change in relationship between systematic risk factors and banking stock returns in the light of this crisis.

The objective of this paper is to identify and capture the relationship between major systematic risk factors and banking stock returns in consideration of recent global financial crisis for a prominent emerging economy like India.

The rest of the paper is structured like this: Section 2 gives an outline of concerned literature. Section 3 elucidates the data and methods used. Section 4 discusses the empirical results. Section 5 reports the conclusions and implications of the study.

REVIEW OF LITERATURE

After an extensive survey of literature, we concluded that most of the studies have analyzed the relationship between macroeconomic or systematic risk factors and stock returns at the aggregate level rather than at sectoral level. Out of those, who have examined the phenomenon at sectoral level for banks, majority have taken up the developed markets for their study. Also, almost all of the studies (barring a few exceptions) have restricted their research framework to maximum of three systematic risk components – Market risk, Interest Rate risk and Exchange Rate Risk. Several studies have taken up the risk (volatility transmission and spill over) part of this

association rather than the return perspective. While, the literature on impact of financial crisis on the relationship between systematic risk components and banking stock returns is also scant. Many studies have examined the relationship between bank specific factors like bank's size, non-performing assets, amount of deposits and advances on their stock returns. Prominent studies are discussed herein.

Stone (1974) and Fama & Schwert (1977) evidenced that interest rates are important in explaining stock returns and they significantly improve explanatory power.

Choi et al. (1992) developed a multi factor model to explain banking stock returns which comprised of market, interest rate and exchange rate risk. They found the beta coefficients of these risks to be significant in different time periods.

Sukcharoensin (2013) applied GARCH approach to investigate whether interest rate, market and foreign exchange rate risks had any impact on sensitivity of banking stock returns in Thailand. She concluded that while large banks were more influenced by market risk, interest rate and foreign exchange risks had more severe impact on small banks due to their inability to efficiently manage and adequately hedge these risks.

Jeyanthi & Mareeswari (2014) examined the impact of global financial crisis on select Indian banking stock returns for a period from April 2004 to March 2012 which was further subdivided into a pre, during and post crisis periods. They found that public sector banks showed moderate volatility and provided fair returns. Overall the performance of banking securities was good when compared to other sectors.

Jeanchutima & Tangjitprom (2015) investigated the effect of interest rate changes on banking stock returns in Thailand for a period from 2002 to 2014 using GARCH model. They found interest rate changes ahs a small impact on banking stock returns and that trading volume instead of bank size is the real moderating factor.

Thus, the uniqueness of present work stems from the fact that a single comprehensive investigation of relationship between a diverse set of systematic risk factors and bank stock returns for a developing market like India, which includes the impact of Global financial crisis is conspicuous by its absence. This is the research gap which we seek to fill.

RESEARCH METHODOLOGY

Data

The period of present study is January, 2002 to December, 2014. To capture the impact of recent global financial crisis of 2007-08, this total study period is further divided into a pre crisis period (January 2002 to July 2007) and a post crisis period (August 2007 to December 2014). August 2007 has been chosen as the cut off date because around this time, the full blown effect of crisis was evident when BNP Paribas cited "a complete evaporation of liquidity" to terminate withdrawals from three hedge funds.

Frequency of all time series data is monthly. We have taken the sectoral BSE Bankex Index as the barometer of banking stocks in India. We have further taken important macroeconomic variables which are indicators of various systematic risks which the banks face. For interest rate risk, we use 91-day Treasury bill as short term interest rate and 10 Year Government bond yields as long run interest rate. With regards to foreign exchange rate and liquidity risk, rupee-dollar exchange rate and broad money supply (M3) respectively are the proxies. Equity and commodity price risk are represented by market index BSE Sensex and Inflation respectively. The detailed description of data used including their operational definitions, time period, source and symbol (for further use) for each variable is provided in Table 1.

Table 1: Data Description

S. No.	Systematic Risk	Variables	Operational Definition	Time Period	Source	Symbol
1.	-	BSE BANKEX	Banking sector constituents of the S&P BSE 500	Jan. 2002-Dec 2014	BSE	BANK
2.	Market or Equity	BSE SENSEX	Constitutes 30 largest, most liquid and financially sound companies	Jan. 2002 - Dec 2014	BSE	MKT
3.	Short term Interest Rate	91 Day T-Bill Rate	Implicit Yield at Cut-off Price (Per cent)	Jan. 2002 - Dec 2014	RBI	SIR
4.	Long term Interest Rate	10 Year Govt. Bond	India Government Bond Generic Bid Yield 10 Year	Jan. 2002 - Dec 2014	Bloomberg	LIR
5.	Liquidity	Money Supply	Broad Money (M3)	Jan. 2002 - Dec. 2014	RBI	MS

6.	Commodity Price	Inflation	Consumer Price Index, Base 2010	Jan. 2002 - Dec 2014	OECD	INF
7.	Foreign Exchange Rate	Exchange Rate	1 USD in Indian Rupees	Jan. 2002 - Dec 2014	RBI	ER
8.	Economic	Index of Industrial Production	General Index Numbers Of Industrial Production (Base : 2004-05 = 100)	April 2005	RBI	IIP

Note: We have taken IIP data from April 2005 because the base for calculation of IIP was changed in 2005 and the old series was discontinued.

Methods

- **Unit Root Test**

If the mean, variance and auto-covariance of a time series data are time invariant, it is said to be stationary. Stationarity of a data is a prerequisite for applying most advanced econometric techniques. Augmented Dickey Fuller (ADF) unit root test has been used to test for presence of unit root in time series data.

- **Correlation Analysis**

Correlation here has been used to measure the nature and magnitude of short term relation between BSE Bankex and other macroeconomic variables. A comparative bi-variate correlation index has been constructed by dividing the post-crisis bi-variate correlations with their pre-crisis values for each pair of variables. If its value is less than 1, it indicates a decrease in correlation post-crisis as compared to pre-crisis.

$$\text{Bivariate Correlation Index} = \frac{\text{Coefficient of Correlation Post Crisis}}{\text{Coefficient of Correlation Pre Crisis}} \quad [1]$$

- **Regression Analysis**

We have applied a simple multiple regression analysis to determine the significant systematic factors which impact banking stock returns and also elaborate on the nature, magnitude and direction of their relationship. Accordingly, taking banking stock returns as the dependent variable, we have regressed it on other systematic risk variables for all the three periods. Before running regression, we checked for multicollinearity and found no problem as correlation between stationary values of independent variables was very

low (less than 0.3).

The regression equation is:

$$DLOG(BANK_t) = C_0 + C_1DLOG(ER_t) + C_2DLOG(IIP_t) + C_3DLOG(INF_t) + C_4DLOG(LIR_t) + C_5DLOG(MKT_t) + C_6DLOG(MS_t) + C_7DLOG(SIR_t) + e_t. \quad [2]$$

Where, BANK = BSE BANKEX; ER = Exchange Rate; IIP = Index of Industrial Production; INF = Inflation; LIR = Long term Interest Rate; MKT = BSE SENSEX; MS = Money Supply and SIR = Short term Interest Rate.

- As explained in detail in the Introduction section, the regression coefficient is theoretically expected to be positive for Index of Industrial Production (IIP), Market proxy (BSE SENSEX or MKT) and Money Supply (MS). Sign of regression coefficient for Exchange Rate (ER) can be either positive or negative. We expect the sign of regression coefficient to be negative for Inflation (INF), Long term Interest Rate (LIR) and Short term Interest Rate (SIR).

- **Granger Causality Test**

Granger causality has been used in this study to test for presence of any causal relationship between banking stock returns and systematic risk factors. The time series Y is Granger-caused by X if the lagged values of X along with the lagged values of Y provide statistically significant information about the values of Y in the next period. The test is based on the following regressions:

$$Y_t = \beta_0 + \sum_{i=1}^{N} \beta_k Y_{t-k} + \sum_{j=1}^{N} \alpha_i X_{t-1} + u_t \quad [3]$$

$$X_t = \gamma_0 + \sum_{i=1}^{N} \gamma_k X_{t-k} + \sum_{j=1}^{N} \delta i Y_{t-1} + v_t \quad [4]$$

Where, the two variables are tY and tX Error terms are u_t and v_t and the number of lags is denoted by "I" whereas time period is denoted by t. N is optimal number of lags. H_0 (X does not Granger cause Y) is 011=Δ=α for all i's versus the alternative hypothesis that 01≠α and $_t$ 0 (X Granger cause Y) for at least some i's.

Granger causality test establishes short run causality if we take stationary values. "Causality tests by the level Vector Auto Regression (VAR) (non-stationary) can complement the result of the cointegration tests in terms of long-run information" [Worthington & Higgs, 2007]. So, non-stationary level time series data of variables have been used to determine long run causality. Optimal lag length for conducting Granger causality test (both short and long run) has been determined as per the Akaike Information Criterion (AIC) in the VAR framework.

- **Johansen Cointegration Test**

Johansen cointegration test is applied to test the long run cointegrating or equilibrium relationship between banking stock returns and systematic risk factors.

Cointegration means despite being individually non-stationary, a linear combination of two or more time series can be stationary. Cointegration of two or more time series suggests that there is a long run or equilibrium relationship between them. Johansen cointegration test named after Søren Johansen is a procedure for testing cointegration of several time series. Two different likelihood ratio tests were developed by Johansen. They are:

1. Trace test: $$\lambda_{trace}(r) = -T\sum_{i=r+1}^{g}\ln(1-\lambda_i) \quad [5]$$

The null hypothesis of the trace statistics tests is no cointegration H_0: r = 0 against the alternative of more than 0 cointegration vector H_1: r > 0.

2. Maximum eigenvalue test statistics given by:

$$\lambda_{ax}(r, r+1) = T\ln(1-\lambda)_{i+1} \quad [6]$$

Null hypothesis is r cointegrating vectors against an alternative of $r + 1$ cointegrating vectors.

EMPIRICAL RESULTS AND DISCUSSION

ADF Unit Root Test

The Augmented Dickey Fuller (ADF) unit root test results provided in Table 2 reveal that all the variables are non-stationary at level in all three periods of study. Whereas, the first differenced logarithmic values of all variables are stationary.

Non-stationarity of variables at level renders them suitable for long run causality and cointegration analysis. While, the stationarity of these variables at first difference permits short run causality and regression analysis.

Table 2: ADF Unit Root Test Results

Variables		At Level		Log of First Difference	
		T-Statistic	Probability	T-Statistic	Probability
BANK	Total Period	-2.10	0.54	-11.41*	0.00
	Pre Crisis	-2.22	0.47	-8.33*	0.00
	Post Crisis	-0.04	0.95	-7.61*	0.00
MKT	Total Period	-2.24	0.46	-11.21*	0.00
	Pre Crisis	-1.68	0.75	-7.79*	0.00
	Post Crisis	-0.036	0.95	-8.31*	0.00
SIR	Total Period	-3.01	0.13	-13.78*	0.00
	Pre Crisis	-2.07	0.26	-5.54*	0.00
	Post Crisis	-2.01	0.59	-8.24*	0.00
LIR	Total Period	-3.09	0.11	-8.09*	0.00
	Pre Crisis	-2.36	0.40	-7.76*	0.00
	Post Crisis	-3.38	0.06	-5.94*	0.00
MS	Total Period	-2.88	0.17	-12.39*	0.00
	Pre Crisis	1.04	NA	-7.54*	0.00
	Post Crisis	-2.03	0.58	-10.60*	0.00
INF	Total Period	-1.64	0.77	-7.36*	0.00
	Pre Crisis	-1.04	0.93	-6.86*	0.00
	Post Crisis	-3.49	0.05	-5.11*	0.00
ER	Total Period	-1.47	0.83	-10.93*	0.00
	Pre Crisis	-2.17	0.49	-6.40*	0.00
	Post Crisis	-0.66	0.85	-8.37*	0.00
IIP	Total Period	-1.76	0.72	-3.49*	0.04
	Pre Crisis	-0.64	0.85	-10.61*	0.00
	Post Crisis	-1.17	0.68	-2.57*	0.01

*Denotes significant at 5% level.

Correlation Analysis

Bi-Variate Correlation coefficients between Banking stock returns and systematic risk variables for all periods and a comparative Post/Pre Crisis Correlation Index are provided in Table 3. We find a very low negative correlation between Banking stock returns and both Short and long term interest rates. While, there is a high positive correlation between banking stock returns and inflation in all three periods. The correlation between market returns and bankex returns is negative in all periods while it is positive with changes in money supply. There is very low correlation between exchange rate changes and banking stock returns. The correlation between banking stock returns and IIP is negative in total and post crisis periods, while it is positive in pre crisis period.

Table 3: Bi-Variate Correlation (All Periods) & Post/Pre Crisis Correlation Index

Variables	Total Period	Pre Crisis	Post Crisis	Post/Pre
BANK – MKT	-0.61	-0.37	-0.64	1.76
BANK – SIR	-0.01	0.07	-0.03	-0.47
BANK – LIR	-0.08	-0.08	-0.07	0.85
BANK – MS	0.22	0.36	0.20	0.57
BANK – INF	0.87	0.74	0.90	1.22
BANK – ER	0.00	0.07	-0.04	-0.53
BANK – IIP	-0.24	0.04	-0.32	-7.98

Regression Analysis

The multiple regression analysis results are shown in Table 4. The explanatory power of regression models (R^2) is 82% in total period, 70% in pre crisis period and about 87% in the post crisis period. The F-statistic of all the three models is highly significant implying well specification of the model. In the total period, Exchange rate, long run interest rate and market are significant independent variables. Banking stock returns has significant negative relation with exchange rate in the total and post crisis periods. Whereas, it is positively related to long run interest rate and equity market proxy in all the three periods. While, the signs of exchange rate and market proxy are in line with the expectations, it is not so for the long run interest rate. The justification for its positive

coefficient stems from the possibility that interest rate changes may have a positive impact on banking stock returns if rise in their lending rate is more than their rise in cost of funds.

Table 4 (a): Multiple Regression Analysis – Model Summary

Model Summary	Total Period	Pre Crisis	Post Crisis
R-squared	0.82	0.69	0.87
Adjusted R-squared	0.80	0.58	0.86
F-Statistic	68.18*	6.12*	76.98*
Prob. (F-Statistic)	0.0000	0.0001	0.0000

*Significant at 5% level.

Table 4 (b): Multiple Regression Analysis – Model Results

Variables	Total Period		Pre Crisis		Post Crisis	
	Coefficient	t-Stat	Coefficient	t-Stat	Coefficient	t-Stat
Constant	0.00	0.34	-0.04	-1.53	0.01	1.00
DLOG(ER)	-0.54	-2.82*	-0.67	-0.97	-0.50	-2.70*
DLOG(IIP)	-0.02	-0.28	0.34	1.71	-0.10	-1.30
DLOG(INF)	-0.10	-0.19	3.63	1.79	-0.39	-0.78
DLOG(LIR)	0.85	3.77*	1.74	2.10*	0.68	2.80*
DLOG(MKT)	1.11	15.48*	0.97	4.64*	1.16	15.83*
DLOG(MS)	-0.25	-0.59	0.17	0.21	-0.25	-0.47
DLOG(SIR)	0.01	0.21	0.22	1.98	-0.07	-0.99

*Significant at 5% level.

Short Run Granger Causality Test

Results of short run Granger causality for all three periods are elucidated in Table 5. In the short run, we do not find any unidirectional or bidirectional causality between systematic risks and banking stock returns for the pre and post crisis periods. However, in the total period, long run interest rate Granger causes banking stock returns and the

banking stock returns Granger causes market returns.

Table 5: Short Run Granger Causality Test Results

Null Hypothesis	Total Period		Pre Crisis		Post Crisis	
	F-Stat	Prob.	F-Stat	Prob.	F-Stat	Prob.
DLOG(ER) does not Granger Cause DLOG(BANK)	2.54	0.08	1.28	0.28	1.20	0.28
DLOG(BANK) does not Granger Cause DLOG(ER)	0.63	0.53	0.11	1.00	0.02	0.89
DLOG(IIP) does not Granger Cause DLOG(BANK)	0.44	0.64	0.12	0.99	0.05	0.82
DLOG(BANK) does not Granger Cause DLOG(IIP)	0.26	0.77	3.39	0.25	0.17	0.68
DLOG(INF) does not Granger Cause DLOG(BANK)	0.62	0.54	0.99	0.46	1.20	0.28
DLOG(BANK) does not Granger Cause DLOG(INF)	0.78	0.46	0.92	0.51	0.91	0.34
DLOG(LIR) does not Granger Cause DLOG(BANK)	3.45*	0.03	0.49	0.86	0.35	0.55
DLOG(BANK) does not Granger Cause DLOG(LIR)	2.01	0.14	1.19	0.33	0.19	0.66
DLOG(MKT) does not Granger Cause DLOG(BANK)	1.63	0.20	0.44	0.89	0.02	0.89
DLOG(BANK) does not Granger Cause DLOG(MKT)	3.73*	0.03	0.31	0.96	0.05	0.83
DLOG(MS) does not Granger Cause DLOG(BANK)	0.28	0.76	0.67	0.71	0.23	0.63
DLOG(BANK) does not Granger Cause DLOG(MS)	0.30	0.74	1.33	0.26	0.05	0.83
DLOG(SIR) does not Granger Cause DLOG(BANK)	0.90	0.41	1.14	0.36	0.71	0.40
DLOG(BANK) does not Granger Cause DLOG(SIR)	1.25	0.29	0.64	0.74	0.16	0.69

*Significant at 5% level.

Long Run Granger Causality Test

Table 6 provides long run causality test results for systematic risk factors and bankex. We find bidirectional causality between exchange rate and bankex in total period, while there is a unidirectional causality from exchange rate to bankex in post crisis period. Banking stock Granger cause IIP in total and post crisis periods. Inflation and Money Supply Granger cause Bank in all three periods. Bankex Granger causes Long run interest rate and money supply in pre crisis and is itself Granger caused by market in the same period. Short run interest rate is Granger caused by bankex in the total and post crisis period.

Table 6: Long Run Granger Causality Test Results

Null Hypothesis	Total Period		Pre Crisis		Post Crisis	
	F-Stat	Prob.	F-Stat	Prob.	F-Stat	Prob.
ER does not Granger Cause BANK	5.06*	0.01	2.64	0.06	4.35*	0.02
BANK does not Granger Cause ER	3.32*	0.04	1.13	0.34	1.35	0.27
IIP does not Granger Cause BANK	0.43	0.65	1.59	0.23	0.79	0.46
BANK does not Granger Cause IIP	3.64*	0.03	2.75	0.07	4.25*	0.02
INF does not Granger Cause BANK	5.10*	0.01	8.69*	0.00	4.14*	0.02
BANK does not Granger Cause INF	1.43	0.24	0.62	0.61	0.57	0.57
LIR does not Granger Cause BANK	1.79	0.17	0.67	0.57	1.61	0.21
BANK does not Granger Cause LIR	1.21	0.30	3.02*	0.04	0.52	0.60
MKT does not Granger Cause BANK	1.23	0.29	2.96*	0.04	0.79	0.46
BANK does not Granger Cause MKT	0.13	0.88	0.46	0.71	0.11	0.90
MS does not Granger Cause BANK	4.15*	0.02	7.95*	0.00	3.44*	0.04
BANK does not Granger Cause MS	0.36	0.70	5.13*	0.00	0.37	0.69
SIR does not Granger Cause BANK	0.05	0.96	1.63	0.19	0.44	0.64
BANK does not Granger Cause SIR	6.05*	0.00	0.61	0.61	4.38*	0.02

*Significant at 5% level.

Johansen Cointegration Test

Results of Johansen cointegration test between systematic risk factors and banking index based on Trace and maximum Eigen value statistics for all the three periods are presented in Table 7. We find presence of two cointegrating equations between bankex and money supply in the total period. There is one cointegrating equation between bankex and short run interest rate in the total period. Bankex is cointegrated with Industrial production and inflation through one cointegrating equation in the pre crisis period. We find no cointegration between the variables in the post crisis period.

Table 7: Johansen Cointegration Test Results

Variables	Hypothesized No. of CE(s)	Total Period		Pre Crisis		Post Crisis	
		Trace Stat.	Max-Eigen Stat.	Trace Stat.	Max-Eigen Stat.	Trace Stat.	Max-Eigen Stat.
BANK - ER	None	17.06*	11.46	4.78	4.51	10.43	9.67
	At most 1	5.59*	5.59*	0.27	0.27	0.76	0.76
BANK - IIP	None	8.72	8.72	20.89*	20.84*	12.00	11.92
	At most 1	0.00	0.00	0.05	0.05	0.07	0.07
BANK - INF	None	14.85	9.69	22.50*	20.73*	6.40	6.40
	At most 1	5.15*	5.15*	1.76	1.76	0.00	0.00
BANK - LIR	None	10.44	10.19	13.43	13.41	10.63	10.25
	At most 1	0.26	0.26	0.02	0.02	0.37	0.37
BANK – MKT	None	4.54	4.54	10.98	9.41	11.11	11.08
	At most 1	0.00	0.00	1.57	1.57	0.03	0.03
BANK – MS	None	45.36*	37.72*	39.91*	24.57*	8.44	7.94
	At most 1	7.64*	7.64*	15.35*	15.35*	0.50	0.50
BANK - SIR	None	14.73	14.71*	4.45	4.43	13.78	13.74
	At most 1	0.02	0.02	0.02	0.02	0.04	0.04

*Significant at 5% level.

CONCLUSION AND IMPLICATIONS

Banking stocks are more vulnerable to changes in macroeconomic variables making them more exposed to systematic risks. This paper examines the relationship between various macroeconomic variables and banking stock returns in order to find out significant sources of systematic risks in banking stock returns in India. Banking stock returns have been calculated using BANKEX and besides market risk as represented by SENSEX, the following six macroeconomic variables have been analysed- IIP, Exchange Rate, Inflation, Interest rate (both short run as well as long run) and money supply. Monthly data for the period 2002-2014 has been analysed using Unit root test,

correlation, regression, Granger causality (both short and long run) and cointegration test. The total study period was further divided into a pre crisis (before August 2007) and a post crisis period (August 2007- December, 2014) to analyse the changes, if any, in the sources of systematic risks.

We find that banking stock returns had significant negative correlation with market and significant positive correlation with inflation. Regression results reveal that exchange rate, market factor and long term interest rate are significant in explaining banking stock returns in India in the total study period as well as post crisis period (with R^2 being 82% and 87% respectively). However in the pre crisis period currency risk (represented by exchange rate) was not found to be significant. This may be due to the fact that the demand for banking services is primarily domestic in India. Short run causality results reveal unidirectional causality from long run interest rate to banking stock returns and from banking stock returns to market returns in the total period but no causality during the two sub periods. On the other hand, long run causality results reveal that inflation and money supply Granger cause bankex while bankex Granger causes IIP and short term interest rate. This may due to the increased efficiency of Indian stock market wherein banking stock prices reflect in advance the expected changes in real economic activity and interest rates. Hence, there seem to be a lead lag relationship between banking stock returns and various macroeconomic sources of risks.

We found long run cointegration between money supply and banking stock returns as well as between banking stock returns and short run interest rate during the total period. However this co integration disappears in post crisis period.

These results provide support to the argument that besides market risk, interest rate risk and currency risk are also priced in banking stock returns. Liquidity risk premium becomes significant in explaining banking stock returns in India only in the long term and not in the short term. These findings are pertinent for policy makers, regulators and investors at large. Policy makers and regulators should pre-empt the impact of their macroeconomic policies and resultant changes in systematic risk factors on banking stock returns. On the other hand, they can also look in banking stock performance for cues regarding future changes in macroeconomic variables. Investors can devise their investment strategies in banking sector based on expectations about short term interest rate and exchange rate

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