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AN EMPIRICAL RELATIONSHIP BETWEEN INDIAN CAPITAL MARKET & BANKING SECTOR

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Abstract
We investigate the relationship between the Stock market and Banking sector in India in this study. The object of the study is to analyze the long run relationship between Banks the represented by bank index of Nifty and composite price of capital market represented by NIFTY. The data used in this study is collected from NSE website. The empirical investigation is carried out using daily data on two stock indices namely the daily stock index of National Stock Exchange named NIFTY and the daily stock index of the entire banking system named BANK NIFTY. A total of 1000 observations have been included in the present analysis. The major statistical tools used in the study are unit root test, Granger causality test, cointegration analysis, impulse response function and error variance decomposition. The objective of the study is to examine whether any long run relationship exists between these two indices. Johansen cointegration analysis accepted the null hypothesis of no cointegration. Granger causality test also ratify the result obtained from cointegration analysis. Impulse response function and error variance decomposition also suggests the absence of any significant relation between the series. Thus we conclude that the movement of the general stock index is not in conformity with the movement of the stock index of the banking sector.

Introduction
Economic development & growth of any country depends upon a perfect financial system. Financial system played a significant role in the economic growth of a country by mobilising the scattered savings into the productive investment. Indian financial system comprises four major components like financial institutions which include banking institutions, financial markets which includes capital market, financial instruments & financial services. With the introduction of liberalization, privatization, and globalization policy tremendous changes have happened in the Indian financial system. With the sweeping economic changes witnessed globally towards more market oriented economies, the government of India too has adapted radical economic policy measures to revitalise its economy. With the opening of the economy to multinationals and the adoption of more liberal economic policies, the economy is driven towards the free market economy.

Banking sector & capital market sector of India have witnessed growth in the volume of fund as well as the number of transactions. Capital market occupies a pivotal position in the financial system. It performs several economic functions and renders invaluable services to the investors, companies, and to the economy as a whole. An efficient capital market is very important for economic development. It ensures best possible flow of savings into most profitable channel. It comprises both primary market and secondary market. Bombay stock exchange and national stock exchange are two leading national stock exchanges in India. Bombay stock exchange is the Asia's oldest stock exchange. National stock exchange is an electronic screen based system which is connected through a satellite network. Banking in India came into existence in the last decades of the eighteenth century. The banking sector play important role in the economy by mobilising savings from various sectors. The Indian banking system consists of public sector banks, private sector banks, foreign banks, regional rural banks, urban co-operative banks and rural co-operative banks. The Nifty is well diversified, actively traded fifty shares index consisting twenty two sectors of the economy. It provides investor and market intermediaries a bench mark that capture the capital market performance in India. Bank nifty is the bank index which represent 12 most liquid and large capitalized stock from the banking sector which trade on the national stock exchange. It provides a bench mark that represent banking sector performance in Indian capital market. The banking sector has very important role in the capital market. The result of the study facilitate in identifying whether the movement of banking sector is the result of NSE nifty or vice verse. The object of the study is to analyze the long run relationship between the composite price of the stock from the banking sector represented by Bank Nifty and composite price of capital market represented by NIFTY.

Literature review
Anjali and Thomachan[4] (2015) the study is attempt to find out the long run relationship between capital market and banking sector by analysing the stock price of federal bank and Nifty. They used daily data from 2005 to 2014. The statistical tools used in their

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study are Unit root test, Granger causality, cointegration analysis, impulse response function and error variance decomposition. The study concludes that there is no long run relationship between stock price of federal bank and Nifty.
Subburayan and srinivasan[5] (2014) in thier study, they examine the long run relation between macroeconomic variables and CNX Bankex returns. The economic variable considered for this study are interest rate, exchange rate and inflation rate & nifty bank for Bankex returns. In this they used statistical variables like ADF, regression, cointegration test & Granger causality test. The findings of the study shows that macroeconomic variable in the study have long run and causal relationship with bankex.
Patel[6] (2012) explores in his study the effect of macroeconomic determinants on the performance of the in Indian stock market. The macro economic variables are interest rate, inflation rate, exchange rate, index of industrial production, money supply, Gold Price, Silver price & oil price. To measure the market performance Sensex and Nifty are used in this study. Augmented dickey fuller unit root test, johansen cointegration test, Granger causality test and vector error correction test are the statistical tests used for the study. The result of the study shows that there is long run relation between stock market indices and all the macro economic variables included in the study.
Odhiambo[7] (2010) in his study "Are Banks and stock market positively related?" analyses whether the service rendered by the bank and stock markets are related in South Africa. This study uses ARDL-Bounds testing approach to examine this linkage. In his study, he concludes that there is positive relation between bank development and stock market development in South Africa.

Methodology & Data

The empirical investigation is carried out using daily data on two stock indices namely the daily stock index of National Stock Exchange named NIFTY and the daily stock index of the entire banking system named BANK NIFTY. The period of the study is 3 January 2011 to 28 August 2015. A total of 1000 observations have been included in the present analysis.
The major statistical tools used in the study are unit root test, Granger causality test, cointegration analysis, impulse response function and error variance decomposition.

Testing for unit roots

An analysis of the properties of time series precedes any statistical investigation using time series variables. An important aspect of the time series that has received much attention in the time series literature is the phenomenon of nonstationarity. If the time series variables are nonstationary, regressing one time series on another using ordinary least squares will give rise to the problem of spurious regression; that is, absence of any meaningful statistical relationship between variables. Thus, it is necessary to examine the stationarity of the time series variables before using them in regression analysis.
A number of testing procedures known as unit root tests are available in the literature to determine stationarity of time series variables. The present study utilizes Dickey Fuller test of stationarity. The test is available in different forms depending on whether the variable under consideration has no intercept, intercept and intercept and trend. Moreover, the test is often used in augmented form to get rid of the problem of autocorrelation between residuals. The most general form of the test statistic in the augmented form is given as:

$$\Delta y_t = \beta_1 + \beta_2 t + \gamma y_{t-1} + \sum_{i=1}^{n} \alpha_i \ \Delta y_{t-i} + \varepsilon_t \qquad (1)$$

where the test statistic is known as the $\hat{\tau}$ statistic based on γ from equation (1)

Johansen cointegration test.

Given a group of nonstationary time series, it is necessary to establish whether the series are cointegrated or not. If the time series are cointegrated, it is important to identify the cointegrating (long run equilibrium) relationship between them. A number of methods for testing cointegration have been proposed in the literature. The widely used procedure for determining the existence of cointegration among a set of nonstationary I (1) variables is the Johansen procedure. In the Johansen framework the first step is the estimation of a p^{th} order vector auto regression (VAR) in k variables, namely:

$$Y_t = \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \ldots\ldots\ldots\ldots\ldots \pi_p Y_{t-p} + \varepsilon_t \qquad (2)$$

where Y_t is a (kx1) vector of nonstationary I (1) variables, π_i is an (nxn) matrix of parameters and ε_t is an (nx1) vector of innovations. Johansen procedure is based on vector error correction (VECM) which is a reparameterization VAR (1) and is given as:

$$\Delta Y_t = \pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots\ldots\ldots + \Gamma_{p-1} \Delta Yt_{-(p-1)} + \varepsilon_t \qquad (3)$$

where $\pi = \pi_1 + \pi_2 + \ldots\ldots\ldots\ldots\ldots \pi_{p-1}$, and $\Gamma_i = -(\pi_{i+1} + \pi_{i+2} + \ldots\ldots\ldots\ldots\ldots \pi_p)$

Johansen suggests two test statistics namely λ_{max} statistics and λ_{trace} statistics to determine the cointegrating rank (number of cointegrating relationships). Both test statistcs establishes the rank of the π matrix based on its Eigen values (and hence the number of cointegrating relationships)

$$\lambda_{trace(r)} = -T \sum_{i=r+1}^{k} l_n(1 - \hat{\lambda}_i) \qquad (4)$$

$$\lambda_{\max(r,r+1)} = -T \ l_n(1 - \hat{\lambda}_{r+1}) \qquad (5)$$

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The decision to accept or reject the existence of cointegrating relationship between the variables depends on the value of the test statistic obtained from the sample compared to the critical values. If no cointegration has been established between the variables, then the entire model (2) is formulated in first differences as:

$$\Delta Y_t = \pi_1 \Delta Y_{t-1} + \pi_2 \Delta Y_{t-2} + \ldots\ldots\ldots\ldots\pi_p \Delta Y_{t-p} + \varepsilon_t \quad (6)$$

Granger causality test.

The notion of causality and noncausality play a key role in studying the predictive properties of multivariate time series models. The widely used test procedure to test causality is the Granger causality test. To implement Granger Casualty test consider a bivariate VAR model in X_t and Y_t with p lags in both variables:

$$Y_t = \sum_{i=1}^{p} \alpha_i Y_{t-i} + \sum_{i=1}^{p} \beta_i X_{t-i} + \varepsilon_{1t} \quad (7)$$

$$X_t = \sum_{i=1}^{p} \lambda_i X_{t-i} + \sum_{i=1}^{p} \delta_i Y_{t-i} + \varepsilon_{2t} \quad (8)$$

There are four possibilities in the system of equations (6) and (7) given above. Unidirectional causality from Y_t to X_t if the estimated δi in equation (7) are statistically different from zero as a group and the set of estimated βi coefficients in (6) is not different from zero. Unidirectional causality from X_t to Y_t if the set of βi coefficients in (6) is statistically different from zero and the set of δi is not statistically different from zero. Bidirectional causality is indicated when the sets of X_{t-i} and Y_{t-i} coefficients are statistically different from zero in both equations. There is no causality when X_{t-i} and Y_{t-iI} coefficients are not statistically different from zero. If all the variables in the VAR are stationary a direct way to test Granger Causality is to use a standard F test given as:

$$F = \frac{(RSSr - RSSur)/m}{RSSur/(n-K)} \quad (9)$$

If the variables are nonstationary and noncointegrated**,** Granger causality test is implemented after reformulating the model in first differences.

Impulse response function

Impulse Response Function shows the effects of shocks on the adjustment path of variables. The advantage of examining IRFs rather than the VAR coefficients is that they not only show the size of the impact of the shock but also the rate at which the shock dissipates, allowing for interdependencies between variables. Shin and Pesaran defines the impulse response function as, "An impulse response function measures the time profile of the effects of shocks at a given point in time on the (expected) future values of variables in a dynamic system".

The impulse response function is defined as:

$$IR(m,h,Z_{t-1}) = E(Y_{t+m}/e_t = h, Z_{t-1}) - E(Y_{t+m}/=Z_{t-1}) \quad (10)$$

Where m denotes the time, h = (h1 ……hm) is nx1 vector denotes the size of shock, Z_{t-1} denotes accumulative information about the economy from the past to time t-1.

A major problem with the IRF is identification of impulse responses. Thus econometricians impose additional restrictions on the VAR system for identification. One possible identification restriction is to use the Choleski decomposition that a series has no contemporaneous effect on other series. **Forecast Error Variance decomposition.**

A second approach to study the effects of various shocks is to consider the contribution of each type of shock to the forecast error variance. According to Enders (2010), the forecast error variance decomposition tells us the proportion of the movement in a sequence due to its "own" shocks versus shocks to the other variables. Forecast error variance decomposition decomposes total variance of the forecast error of each variable in to that due to its own shock and due to shocks to other variables. This decomposition is often expressed in proportional terms. Thus while Impulse Response Function helps us to study the dynamic interrelationship between variables, variance decomposition give information about volatility.

Empirical analysis and results

The objective of the present analysis is to identify whether there exists any long run relationship between the general stock index and the stock index of the banking sector. Daily price index of National Stock Index (NSE) and stock index for the entire banking industry from 3 January 2011 to 28 August 2015 has been used in the present study. The series are labeled NIFTY and BANK respectively.

Since it is customary in time series econometrics to analyze the time series properties of time series variables before using them in empirical analysis, we start with the examination of the order of integration of the variables. Determination of the order of integration is necessary for assessing whether the variables are stationary or not. The Augmented Dickey Fuller (ADF) test is used to test the order of integration of variables. The test results in level and first difference of both variables are given in table 1.

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Table1: Test Result of Unit Root Test

Variable	**Test statistic**
NIFTY	-0.393139 (0.3829)
Δ NIFTY	-30.88582 (0.0000)*
BANK	-3.042805 (0.1210)
Δ BANK	-30.78759 (0.000)*

*indicate significance at 5%level
Figures in the bracket are P values

The results indicate clearly that the null of unit root has been accepted in level, but rejected in first differences for both variables. This confirms that the variables are integrated of order (1) and are thus stationary in first differences. Since both variables are integrated of the same order we can proceed to test for cointegration.

Cointegration analysis is used to identify long run relationship between variables. Johansen system cointegration analysis has been used in the present study to identify cointegration between NIFTY and BANK. The test results are presented in table 2.

Table 2: The Johansen Cointegration Test

Hypothesized No of CE(s)	Eigenvalue	λ_{trace}	λ_{max}
None	0.005369	6.678014 (0.6154)	6.223439 (0.5847)
Atmost 1	0.000393	0.454575 (0.5002)	0.454575 (0.5002)

Figures in the bracket are P values

Both test statistics, λ_{max} and λ_{trace} accepts the hypothesis that there is no cointegration between the variables. Hence we conclude that there is no long run co movement between BANK and NIFTY.

Since no cointegration has been observed between variables, the entire model has been reformulated in first differences to examine whether there is any short run relationship between NIFTY and BANK. The variables are labeled DNIFTY and DBANK. The optimum lag length has been selected by using information criteria. The result of VAR (2) in first differences is presented below.

$DBANK_t = 4.83 + 0.15DBANK_{t-1} + 0.04DBANK_{t-2} - 0.18DNIFTY_{t-1} - 0.28\ DNIFTY_{t-2}$
(5.73) (0.06) (0.06) (0.18) (0.18)
[0.84] [2.45]* [0.73] [-1.02] [-1.53]

$DNIFTY_t = 1.47 + 0.04DBANK_{t-1} + 0.01DBANK_{t-2} - 0.01DNIFTY_{t-1} - 0.07DNIFTY_{t-2}$
(1.94) (0.02) (0.02) (0.06) (0.062)
[0.75] [2.05]* [0.79] [-0.21] [-1.17]

Figures in () are standard errors and figures in [] are t values.

*Indicates significance at 5% level

An examination of the result of VAR in first differences clearly indicate that except the first lag of DBANK in the first and second equation no other coefficient is statistically significant. Thus though BANK has some influence on NIFTY, the converse is not true.

To obtain further insight about the interrelationship between BANK and NIFTY Granger causality test has been performed. The result of the test statistic clearly shows that there is no causality between variables at 5% level even though DBANK Granger causes DNIFTY at 10% level.

Table3: Granger Causality Test

Null Hypothesis	F statistic	Probability
DNIFTY does not Granger Cause DBANK	1.78143	0.1698
DBANK does not Granger cause DNIFTY	2.50809	0.0819*

*indicates significance at 10%level

The plots of impulse response coefficients for a one standard deviation shock in both DNIFTY and DBANK are presented in figures 1. These responses are found to be very small indicating that there is very little information contained in each series about the future value of the other series.

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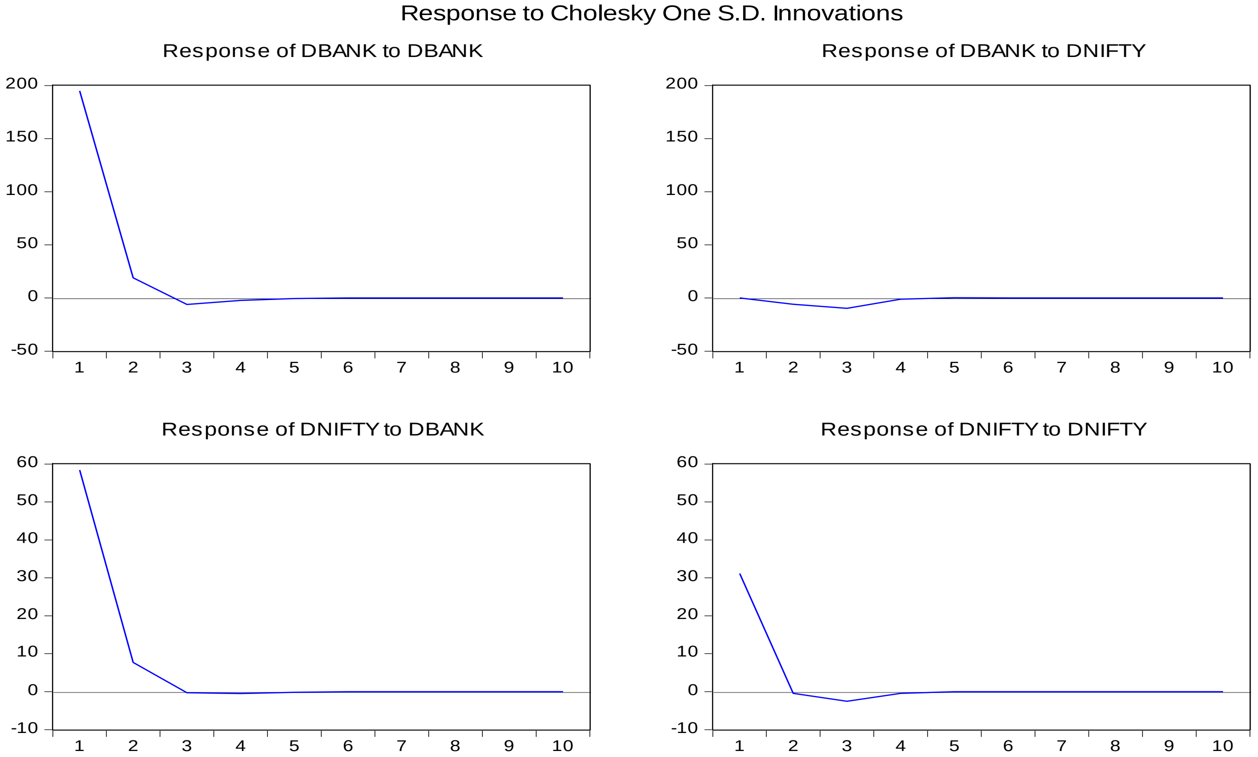
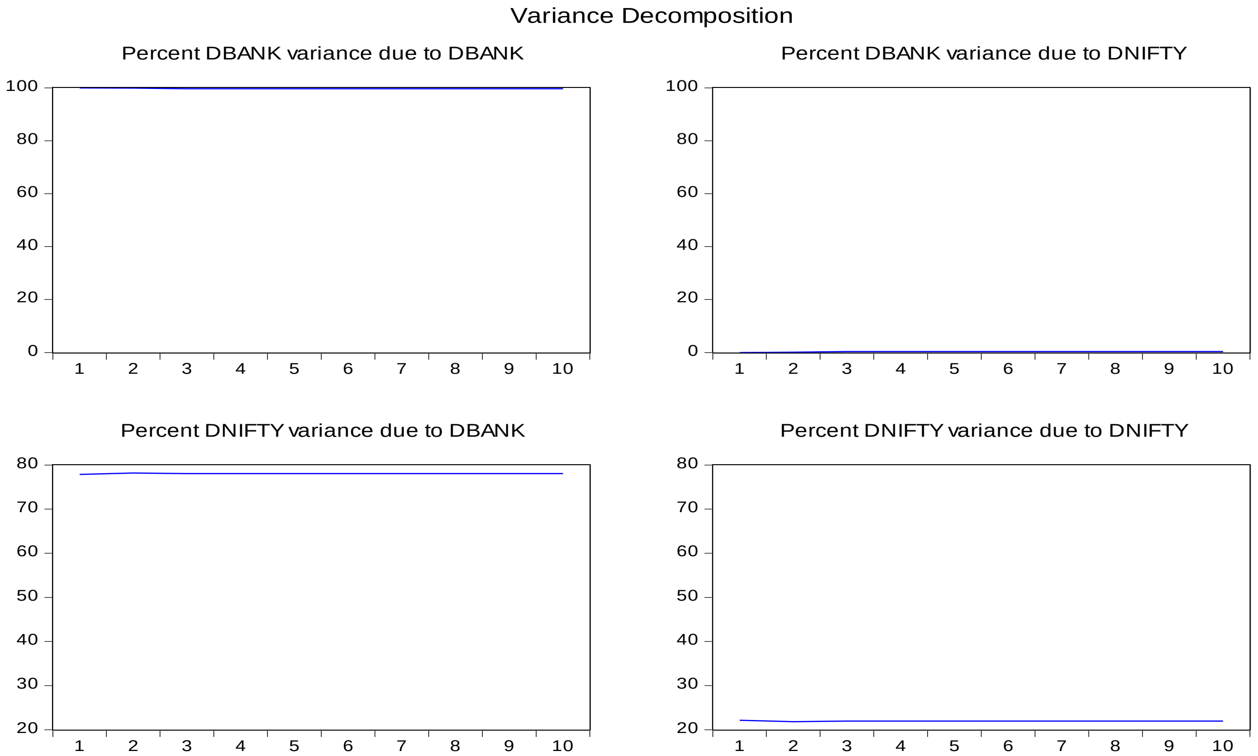


The proportion of forecast error variance of DNIFTY and DBANK for the forecast horizon of up to 10days is presented in figure 2. It is evident from the result that forecast error variance of both series remain constant throughout the forecast horizon.



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Conclusion

This study examined the long run relationship between the general stock index named NIFTY and the stock index of the banking sector named Bank Nifty. The objective of the study was to examine whether any long run relationship exists between these two indices. Johansen cointegration analysis accepted the null hypothesis of no cointegration. Granger causality test also ratify the result obtained from cointegration analysis. Impulse response function and error variance decomposition also suggests the absence of any significant relation between the series. Thus we conclude that the movement of the general stock index is not in conformity with the movement of the stock index of the banking sector.

References

1. Enders & Walter, Applied Econometric Time series, Third Edition, Wiley Student edition, 2010.
2. Kerry Patterson, An introduction to Applied Econometrics, Palgrave, New York 2000.
3. Damodar Gujarati, Econometrics by example, Palgrave macmillan, New York 2011.
4. A. Anjali and K. T. Thomachan, “Long run relationship between Capital Market and Banking Sector – A Co-integration on Federal Bank”, Bonfring international journal of industrial Engineering and Management Science, Vol. 5, pp 5 – 9, No.1, March 2015.
5. Baranidharan Subburayan and Dr.Vanitha sreenivasan, “The effect of macroeconomic variables on CNX Bankex returns: Evidence from Indian stock market” International Journal of Management & Business Studies, Vol. 4, Issue 2, pp 67 – 71, April-June 2014.
6. Samveg Patel, ‘The effect of macroeconomic determinants on the performance of the Indian stock market”, NMIMS management review, Vol. XXII, pp 117 – 127, August 2012.
7. Nicholas M Odhiambo, “Are Banks and Stock Markets Positively related? Empirical evidence from South Africa”, The journal of applied business research, Vol.26, pp17 – 26, No.6, November – December 2010.