CORRELATION BETWEEN INDIAN & US STOCK MARKET RETURNS-BEFORE AND DURING THE SUBPRIME CRISIS

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ABSTRACT

The present paper proposes to analyze the correlation between Indian and US capital markets. The returns from the Indian Stock market with reference to the previous day's return of the US stock market shows lot of feedback effect from US to India, whereas the returns from the US stock market shows no significant reaction. An econometric test is applied to indicate whether connections between world capital markets are stronger during times of growth or during periods of crisis. Daily return data is used for calculations. The results indicate that the relation between the two indexes was stronger during the financial crisis that broke out mid-2007 than before the crisis. The testing shows that relationship between NSE and NYSE is more volatile during subprime crisis.*

Key words: *stock markets, subprime crisis, contagion, correlation, volatility*

Introduction

Global financial situation was triggered by the subprime mortgage crisis in the United States, which became apparent from mid-2007. Financial crises are characterized by the sudden and simultaneous materialization of risks that, during normal times, seemed independent. As a result, risk lowering opportunities are considerably reduced just when the need for them is greater, which causes significant threats to the global financial system. As capital market connections intensified, their trends have become more and more correlated and, in general, the world's large stock markets post similar evolutions. Thus, during the growth stage of the economic cycle, stock markets register positive evolutions, but as a crisis occurs, their falls become strongly correlated as well.

The first clues that signaled the recent financial crisis emerged in the summer of 2007 when two hedging funds managed by investment bank Bear Stearns entered difficulty. The funds had invested in instruments based on high risk mortgage loans. That was the beginning. Gradually, the crisis spread internationally and the fall of the financial sector stirred chaos across the entire economy. The situation of financial markets worsened starting September 2008, with the bankruptcy of American investment bank Lehman Brothers. Financial market confidence dropped considerably and risk premiums rose to extremely high levels. After an initial recovery period, the crisis reached emerging countries. In the last quarter of 2008, many emerging economies faced problems with their local currencies and stock markets. Currency exchange rates were under pressure in all regions, causing a combination between currency depreciation and lowering of foreign reserves. When crisis affects the real activities, it affects the stock market, as profit expectation on financial investments would be lower. If financial investment would be affected, its impact would be felt on the real investment, as real investment would not increase. Once the real sector activity lessens, that would affect the entire economy. Thus, it is mainly the expectation of the investors mainly works affecting

both the financial and real investment in the economy. This paper describes the methodology and testing results to examine the correlation between two indexes.

LITERATURE REVIEW

According to the literature in the field, financial crises tend to strengthen correlations between markets instead of weakening them.

Forbes and Rigobon (2002) have shown that, during the Asian crisis of 1997 and the crash of the capital market in the USA in 1987, there was only interdependency and not contagion between markets, where contagion is defined as significant change in cross-market linkages during times of turbulence.

Markwat, Kole and van Dijk (2009) find that stock market contagion operates according to a domino effect, where local emerging market crashes evolve into more severe regional or even global crashes.

Suresh, Anli (July, 2010) focus on various aspects of current financial crisis and its impact on Indian capital market in the arena of financial innovations and global best practices and their policy implications. Researcher found that financial stability in India has been achieved through perseverance of prudential policies which prevent institutions from excessive risk taking and financial markets from becoming extremely volatile and turbulent which boosted investors confidence.

Viswanathan, K.G (2010) Study the Causes and magnitude of the crisis , impact on emerging markets & Describe the Global response to the crisis. Research investigates the Indian economy prior the crisis, during the crisis & transmission of the Crisis to the Indian economy.

Singh, Ajit., Zammit, Ann (Dec, 2010) describes the current financial crisis & through analytical questions try to cover the issues such as the better than expected performance of the world

economy, the role of global financial imbalances, and whether or not economic theory has been helpful.

Tudor, Cristiana (Feb, 2011) investigates causal relationships and short-term interaction mechanisms among six Central and Eastern European stock markets and the USA stock exchange, while paying special consideration to the effects of the 2007-2009 global financial crisis. They suggest that the potential for diversifying risk by investing in different CEE markets is limited during financial turmoil.

Arekar, Kirti., Jain, Rinku (2011) study market performance of different sectors i.e. Information Technology and Banking with respect to the market & analyzed that which sector is impacted most during the recession period. The period from January 2007 to November 2010 showed Indian market's march towards the highest-ever levels of market capitalization and stock indices in 2007, and, thereafter, a precipitous fall in 2008.

Duncan Stuart, Andrew., Kabundi, Alain (Oct, 2011) studies volatility comovement in world equity markets between 1994 and 2008. A dynamic factor model (FM) is estimated using two-year rolling window regressions. The FM.s time-varying variance shares of global factors map variations in volatility comovement over time and across countries. The results indicate that global volatility linkages are particularly strong during .nancial crises in Asia (1997-8), Russia (1998), and the United States (2007-8). Researchers observe decoupling between emerging and world volatilities between 2001 and 2007. Recoupling occurs during 2008, thus identifying emerging market investments as a temporary hedge against volatility spillovers from the US subprime crisis.

Sakthivel, G. (March, 2012) Study the comprehensive view of the current global recession of Indian stock market through an analysis of various impact of India stock market that have contributed to it. The stock markets reflect the buoyancy of the economy & Indian stock markets also crashed due to a slowdown in the US economy.

Kenett, Dror Y., Raddant, Matthias., Lux, Thomas & Jacob Ben, Eshel (2012) investigated the relations between six important world markets—U.S., U.K., Germany, Japan, China and India—from January

2000 until December 2010 & found that while the developed "western" markets (U.S., U.K., Germany) are highly correlated, the interdependencies between these markets and the developing "eastern" markets (India and China) are volatile and with noticeable maxima at times of global world events. The Japanese market switches "identity"—it switches between periods of high meta-correlations with the "western" markets and periods when it behaves more similarly to the "eastern" markets.

OBJECTIVE

This paper attempts to analyze the correlation between US stock market and Indian stock market and have considered it opportune to perform an econometric test to indicate whether connections between these markets are stronger during times of growth or during times of crisis and therefore decline.

DATA AND METHODOLOGY

To test Correlation we have considered the representative indexes of Indian stock market (NSE) and for US stock market (NYSE). The analysis entails utilizing time series representing the daily values of these two stock market indexes between April 2005 and March 2012, a period we have divided into two intervals:

- April 2005 – June 2007 – before the crisis, when the global economy was in the expansion stage of the economic cycle

- July 2007 – March 2012 – when the global financial system and the world economy went through difficult times marked by the advent of the financial crisis in the United States, its expansion worldwide, the global recession and the time of economic recovery.

The data has been modeled using Linear Regressions, thus for each interval, these two indexes has been expressed in relation to each other, as in the equation below:

$$y = \beta_0 + \beta_1 x + \varepsilon$$

y = dependent variable (NSE daily returns)

x = independent variable (NYSE daily returns)

b_0 = y-intercept

b_1 = slope of the line

ε = error variable

The purpose of modeling is to estimate the coefficients associated to stock market indexes playing the role of exogenous variables to determine their influence on stock market indexes playing the role of endogenous variables. Further to test the normality of data Descriptive Statistics (mean, standard deviation, variance, maximum, minimum, skewness and kurtosis) are considered.

ANALYSIS AND INTERPRETATION

Table1. Statistical description –NSE and NYSE (From April 2005 to June 2007).

INDEX	Mean	S.D	Variance	Max.	Min.	Skewness	Kurtosis
NSE	0.0014	0.0142	0.0002	0.0631	-0.06773	-0.5737	2.7911
NYSE	0.0006	0.0069	0.0000	0.0264	-0.06773	-0.2498	1.9989

Table-1 presents statistical description of two stock indexes of India and US, that is, NSE and NYSE before the subprime crisis period. Under this mean, standard deviation, variance, minimum, maximum, skewness and kurtosis have been calculated. Statistical description is made in order to find out whether the data shows normality or not. Statistical description is being calculated on the basis of the daily closing prices of NSE and NYSE index. The mean of NSE is ranging from .0677 to .0631 and mean of NYSE is ranging from .0677 to .0264. It is observed that the mean return of NSE is greater as compared to NYSE and the variance of NYSE is lower than that of NSE showing that NSE index is highly volatile and risky in nature in comparison to NYSE. The values of skewness and kurtosis determine the normality of the data. The critical values for skewness and kurtosis are 0 and

3 which represents that the observed data is perfectly normally distributed. The calculated values of skewness for NSE and NYSE are at -0.5737 and -0.2498 and values of kurtosis for NSE are at 2.79 which is near about value 3 and for NYSE is 1.9989 respectively. The values from the table show that neither the skewness nor the kurtosis of both the indices shows normality of the data. The skewness of NSE and NYSE is greater than 0 and kurtosis of NSE is less than 3 and that of NYSE is equal to 3 which imply that data does not show normality.

Table2. Statistical description – NSE and NYSE (From July 2007 to March 2012).

INDEX	Mean	S.D	Variance	Max.	Min.	Skewness	Kurtosis
NSE	0.0004	0.0191	0.0004	0.1774	-1.0000	0.4210	8.7694
NYSE	-2.6919	0.0181	0.0003	0.1222	-0.0973	-0.0913	5.9128

Table-2 presents statistical description of two stock indexes of India and US, that is, NSE and NYSE after the subprime crisis period. The mean of NSE is ranging from -1.000 to .1774 and mean of NYSE is ranging from -.0973 to 0.1222. It is observed that the mean return of NSE is greater as compared to NYSE and the variance of NYSE is lower than that of NSE showing that NSE index is highly volatile and risky in nature in comparison to NYSE. The calculated values of skewness for NSE and NYSE are at 0.4210 and -0.0913 and values of kurtosis for NSE are at 8.7694 and for NYSE is 5.9128 respectively. The values from the table show that neither the skewness nor the kurtosis of both the indices shows normality of the data. The skewness of NSE and NYSE is less than 0 and kurtosis of NSE and NYSE is greater than 3 which imply that data does not show normality.

Regression Equations

$$y = \beta_0 + \beta_1 x + \varepsilon$$

y = dependent variable (NSE daily returns)

x = independent variable (NYSE daily returns)

Y= 0.156x+0.001 (for the period Apr 2005 to June 2007)

 Y= -0.104x+0.000 (for the period July 2007 to March 2012)

Summary of Regression Statistics:

Table No. 3

Regression Statistics	(Apr 2005- June 07)	(July 2007-Mar 2012)
Multiple R	0.076	0.0998
R Square	0.006	0.0100
Standard Error	0.014	0.0189
Observations	565	1197

Multiple R value shows the correlation between two variables. Table 3 shows that correlation value is .076 before the subprime crisis and it increases after july 2007 to .0998. It means NSE returns are affected more during the crisis period. Likewise the values of R square which shows the % of variation of dependent variable on independent variable are more during the crisis period. Before the crisis 565 observation and during the crisis 1197 observation are taken for calculation purpose. Value of standard error increases after July, 2007.

CONCLUSION

The research has shown the relations between the two indexes analyzed have been stronger during the financial crisis that broke out mid-2007 than before the crisis. The testing shows that relationship between NSE and NYSE is more volatile during subprime crisis. Economies worldwide are integrated with each other more than ever before. An event in a certain country has immediate and long lasting repercussions elsewhere. Hence it is imperative to study the movement of the Indian Capital Market in the light of the changed circumstances to understand, introspect and anticipate.

REFERENCES

- Arekar, Kirti., Jain, Rinku (2011). "Financial Analysis on Indian Stock Market Volatility during Recession" Advances in Management & Applied Economics, vol.1, no.3, 2011, 127-133 ISSN: 1792-7544 (print version), 1792-7552 (online) International Scientific Press, 2011.

- Duncan Stuart, Andrew; Kabundi, Alain (Oct, 2011). **"**Global Financial Crises and Time Varying Volatility Comovement in World Equity Markets" University Of Johannesburg, Working paper 253

- Forbes, K.J. and Rigobon, R., (2002). "No contagion, only interdependence: Measuring stock market co-movements", Journal of Finance, volume 57, issue 5, pp. 2223-2261.

- Kenett, Dror Y., Raddant, Matthias., Lux, Thomas & Jacob Ben, Eshel (2012) "Evolvement of Uniformity and Volatility in the Stressed Global Financial Village" PLoS One. 2012; 7(2): e31144. Published online 2012 February 8. doi: 10.1371/journal.pone.0031144

- Mink, M. and Mierau, J., (2009). "Measuring Stock Market Contagion with an Application to the Sub-prime Crisis", De Nederlandsche Bank Working Papers, No.217, July.

- Sakthivel, G. (March, 2012) "Global Recession and Dynamics of Indian Stock Market" International Journal of Multidisciplinary Research, Vol.2 Issue 3, March 2012, ISSN 2231 5780

- Singh, Ajit., Zammit, Ann (Dec, 2010).**"**The Global Economic and Financial Crisis A Review and Commentary" Centre for Business Research, University of Cambridge , Working Paper No. 415.

- Suresh, Anli (July, 2010). " Financial Crisis and its Impact on Indian Capital Market in the Arena of Financial Innovations" , Journal of Finance, Accounting and Management, 1(1), July 2010, PP-12-26.

- Tudor, Cristiana (Feb, 2011). "Changes in Stock Markets Interdependencies as a Result of the Global Financial Crisis:Empirical Investigation on the CEE Region" PANOECONOMICUS, 2011, 4, pp. 525-543.

- Viswanathan, K.G (2010). "The global financial crisis and its impact on India" Business Article 1 formatted. Doc(2010).