

The Integration of Indian and Us Stock Market Returns Before, During and After the Financial Crisis

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Abstract

There are significant risk reduction benefits that are available if investors create portfolios that include both US and Indian Stocks. However, during financial crisis the correlation between Indian and US stock indices is high implying that risk reduction benefits vanished when there was market turmoil. In other words, due to contagion effect all markets displayed steep declines with elevated levels of risk.

Keywords: Return, Risk, Diversification, Global Financial Crisis, Contagion, Correlations

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INTRODUCTION

The financial markets all over the world, especially Indian SENSEX, are slowly opening their equity markets to direct as well as indirect foreign investors. Indirect investors include portfolio investors as well as other agencies. This type of increased globalization and development has made the countries prone to international crisis as the risk of the flight of capital increases. Therefore, the focus on return on investments and risk increases as investors look for country specific news and events and resultant shift of capital from one country to another (Angkinand et al. 2010). Some authors such as Frank and Hesse (2009) studied "spillover" effects of the crisis from developed markets to the emerging markets highlighting safety concerns of the international investors in transferring money from the emerging nations.

The linkage between the US stock markets (Standard and Poor's Index and NASDAQ) and Indian Stock Market (SENSEX) is broadly explained by Dhankar and Kumar (2006) as a Market risk rather than a non-market risk where a change in the US Federal interest rate can cause upswing or downswing in the Indian stock market. The non-market risk, on the other hand, is considered as specific to each stock. Sharp and Cooper's (1972) classification of risk-return classes based on New York Stock Exchange common stocks is used as a fundamental classification method to define market and non-market risk.

Dhankar and Kumar (2006) explored the relationship between specific stocks trading in the Indian stock market (non-market risk) as a result of changes in the US stock market and how investors could utilize diversification to reduce non-market risk. The results of Dhankar and Kumar (2006) signify that portfolio non-market risk declines with diversification. Their study reports high positive correlation between portfolio return and risk. Kulsherestha and Mittal (2015) recently provided solid evidence to suggest the volatility in the Indian Financial Market before, during and after the Global Finance Crisis of 2008. However, no further studies have been done so far to assess the return-risk (market risk) between the US and Indian Financial markets before, during and after the global financial markets and, especially, how the diversification strategy to balance return-risk can be explained if the volatility in the market exists.

This study, therefore, aims to study the relationship between the US Financial markets of S&P and NASDAQ with Sensex on risk and return factors before, during and after the global financial markets and how international investors may use the diversification strategy during these three (before, during and after global financial crisis) periods. As a result of our analysis, we provide implications for international investors' diversification strategy as well as guidance for the future.



LITERATURE REVIEW

Researchers have always been interested in studying the risk-return relationship in different markets and have used Sharp and Cooper's (1972) classification method to define market and non-market risk. Previous empirical studies on the relationship between macro-economic factors and stock return can be divided into two broad categories. The

first category involves studies that focused on the impact of macroeconomic factors on stock prices. The second category involves those studies that focused on the relationship between stock market volatility and volatility in the macroeconomic indicators. Even though many studies have focused on the first category and looked at the impact on individual stocks prices (such as Singh 2015; Singh and Singh 2016), there are not many studies that have dealt with the second category. Since this study attempts to explore the relationship between volatility between markets (second category), a discussion of the literature relating to this category is presented below.

In the era of global financial integration, investors prefer cross border investment to diversify their portfolio. If the stock markets of certain countries are co-integrated for a long time, then the benefits of diversification are minimal. The US and Indian financial markets have recently been integrated and have yet shown period independence. Patel (2013) described this phenomenon as dynamic interdependence among Asian equity markets. Even though many Asian countries' financial markets have been fully integrated with the US financial markets, Indian stock market (SENSEX) has shown remarkable independence and has largely been insulated (Patel 2013).

Kumar and Mukhopadyay (2002) examined the relationship between the US and Indian stock markets and found causality and spillover effect running from the US to Indian stock market. Lamba (2004) analyzed the dynamic relationship among India, Pakistan, Sri Lanka, France, Germany, US, UK and Japan from 2000 to 2003 and found that developed equity markets influenced Indian market. However, Indian stock market did not influence either the other Asian markets or the developed markets. However, Lamba (2004) had analyzed the relationship after the events of Asian Financial Crisis of 1997 and September 11, 2001 disastrous event in New York. For Pakistan and Sri Lanka, Lamba (2004) found that these markets are relatively isolated from the major developed markets during the entire sample period of July 1997 - February 2003. The reason for this isolation appears to be due to completely different fundamentals between these countries and there is no major trade relationships between these economies. Mukherjee and Mishra (2007) investigated interdependence of markets of 23 countries of the world including India and found high market integration. In another study, strong evidence of co-integration was found among countries in the same region (Raj and Dhal 2009). Marimuthu (2010) found bidirectional causality between Malaysian and Indian stock markets. However, Joshi (2011) concluded that the US market dominated all Asian markets. Joshi (2011) had investigated the long run relationship between stock markets of US, Brazil, Mexico, China and India and found that co-integration existed among the markets. Siddiqui (2008) similarly explored the relationship between European stock markets and Indian stock market and found that no European stock market played any dominant role for Indian stock market. Impact of the financial crisis during 2004 to 2011 was assessed by Singh and Makkar (2016) on the volatility of Indian commercial banks' stock prices and found that there was a significant difference in the volatility before and after the financial crisis. The study concluded that the news of financial

crisis in the international markets increased the volatility of Indian commercial banks' stock prices. However, Singh and Makkar (2016) focused on the volatility/risk of banking stocks alone and the broad stock indices. Clearly, impact on Indian stock market has been studied by many authors in a variety of studies by many authors, but nobody has looked at these relationships at the time of crisis and beyond from a broader perspective of returns volatility and correlation between the Indian and the US stock market indices.

Therefore, this study attempts to focus on Indian and the US stock markets correlation, returns and risk specifically before, during and after the global financial crisis and how it has evolved into guiding investors in their diversification strategy. This study examines how the relationship between the US and Indian stock market indices has evolved over time before, during and after the financial crisis. This will be a useful exercise for portfolio managers and the investors who are planning to increase their presence in the Indian stock market.



M ETHODOLOGY

The data was collected from Bloomsburg Professional Service. The data was collected from the year 1997 to 2017 for SENSEX, S&P500 and NASDAQ Stock indices. The data is presented in Table 1 for Return and Risk indices. Following models are used to calculate return, risk or standard deviation of returns and the correlation coefficients between SENSEX, S&P 500 and Nasdaq Indices.

$$R_t = \ln(P_t/P_{t-1})$$

Equation no.1

Where, R_t is the yearly return, P_t is the end of the year price and P_{t-1} is the price at the beginning of the year.

$$\sigma_t = \sqrt{\frac{1}{N-1} * \sum (R_t - E(R_t))^2}$$

Equation no.2

Where, σ_t is the standard deviation of returns R_t is the monthly return and $E(R_t)$ is the monthly average return. To compute the correlation coefficient, following equation has been used:

$$\rho_{x,y} = \frac{\sum (x - E(x))(y - E(y))}{\sqrt{\sum (x - E(x))^2 \sum (y - E(y))^2}}$$

Equation no.3

Where, $\rho_{x,y}$ is the correlation coefficient between SENSEX and S&P 500, SENSEX and NASDAQ and S&P 500 and NASDAQ.

The data has been divided using following time periods:

Before Financial Crisis	July 31, 1997 to July 31, 2008
During Financial Crisis	August 31, 2008 to March 31, 2009
After (Post) Financial Crisis	April 30, 2009 to October 31, 2017

The above models (1), (2) and (3) are commonly used statistical tests by most researchers.



RESULTS

The results are presented in Tables 1 and 2. In Table 1, annual returns and risk or standard deviation of return has been shown for the period from 1997 to 2017. This time-period covers dot com era decline in the market followed by financial crisis of 2008/2009. The markets recovered significantly in the period following the financial crisis. This can also be seen from the annual returns and risk which shows that all three indices, namely, SENSEX, S&P 500 and NASDAQ declined sharply during 2001, 2002, 2003 periods (Dot Com decline). The risk for this period was also significantly elevated. Similar decline occurred in 2008 when SENSEX returns declined by about 46% versus about 34% decline for both S&P 500 and NASDAQ indices. However, there is no clear-cut relationship between SENSEX and the US indices following financial crisis.

When the correlation coefficients are calculated between SENSEX against S&P 500 and NASDAQ indices, from Table 2, it is clear that there is a low level of correlation between these markets for the overall period. As shown in Table 2, this correlation is about 0.12 between SENSEX and both US indices. On the other hand, as expected, the correlation between the two US indices (S&P 500 and NASDAQ) is very high at 0.845. However, during financial crisis the correlation coefficient went up significantly between SENSEX and US indices indicating that contagion effect of steep declines in the US markets are felt globally including the Indian market that witnessed a much bigger decline than the US indices. Especially in 2015 the Indian stock markets were negative while the US indices were positive for three reasons: one, it was found that banks had large non-performing assets and bad loans; two, Federal Reserve statements about raising interest rates contributed to reduced flow of funds to Indian markets; and three, the oil price increased crashed the Indian market returns (Parekh, 2016). Fundamental factors between Indian market and the US market are quite different as the Indian market is more inward looking and has relatively very small share of global export of goods and services implying that this market is less dependent on the US market. This is unlike other emerging markets such as, China which is an export-oriented economy. Hence, Indian market should have been insulated from the global financial crisis unlike other emerging markets. The insulation of the Indian market is also evident from the correlation coefficients for the period after financial crisis. In fact, the correlation coefficient between SENSEX and S&P 500 index stood at -0.215 and SENSEX and NASDAQ stood at -0.244 signifying that still large diversification benefits are possible if a portfolio is created where Indian equities are combined with the US equities. As the markets become more mature, open and globalized, these diversification benefits may decline over time.



CONCLUSION

From the results it is evident that significant risk reduction benefits are available if investors create portfolios that include both the US and Indian Stocks. However, during financial crisis the correlation between Indian and US stock indices is high implying that risk reduction benefits vanished when there was market turmoil. In other words, due to

contagion effect all markets displayed steep declines with elevated levels of risk. This research also deals with important investment issues that are relevant not only today but will

continue to be of primary concern in the future. The result of this work should help in developing models for price discovery and provide a framework for investor decision-making.

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Table 1
Yearly Return and Risk of SENSEX, S&P500, and NASDAQ Stock Indices

Year	SENSEX		SPY		NASDAQ	
	Return	Risk	Return	Risk	Return	Risk
1997	-25.11	21.30	9.64	18.21	8.90	19.58
1998	-8.47	28.98	25.40	22.23	35.40	32.54
1999	60.96	29.68	14.82	12.99	62.39	27.52
2000	-20.57	26.03	-5.32	17.01	-37.30	45.64
2001	-22.04	25.80	-15.95	20.05	-29.66	46.92
2002	-8.76	20.80	-15.95	20.05	-29.66	46.92
2003	73.45	23.57	29.94	11.11	51.67	12.89
2004	15.68	23.81	7.14	7.24	5.29	14.56
2005	47.75	21.88	5.67	7.76	6.93	13.79
2006	35.88	19.61	10.80	5.69	4.75	12.18
2007	36.41	27.34	2.09	9.69	7.64	12.18
2008	-46.39	38.61	-34.48	22.36	-34.01	28.20
2009	83.97	33.43	35.02	22.54	53.69	20.98
2010	11.55	19.36	17.11	19.26	23.54	23.03
2011	-3.53	22.41	-2.21	15.77	-3.52	15.99
2012	12.07	13.99	8.67	10.63	7.31	14.80
2013	8.76	13.61	23.38	8.47	32.92	8.12
2014	38.18	11.24	15.50	8.07	15.40	10.29
2015	-14.89	10.30	2.45	13.51	8.03	15.17
2016	20.23	15.57	15.39	10.14	18.00	14.39
2017	14.61	10.37	12.21	3.78	16.90	4.79

Table 2
Correlation Coefficient between SENSEX, S&P500, and NASDAQ Stock Indices

	SENSEX	SPY	NASDAQ
Overall Period (6/30/97 – 10/31/17)			
SENSEX		0.122	0.124
SPY	0.122		0.845
NASDAQ	0.124	0.845	
Before Financial Crisis			
SENSEX		0.133	0.127
SPY	0.133		0.823
NASDAQ	0.127	0.823	
During Financial Crisis			
SENSEX		0.454	0.528
SPY	0.454		0.963
NASDAQ	0.528	0.963	
After Financial Crisis			
SENSEX		-0.215	-0.244
SPY	-0.215		0.944
NASDAQ	-0.244	0.944	