Comparative Analysis of Indian Stock Market with International Markets

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Abstract

The stock market is witnessing heightened activities and is increasingly gaining importance. In the current context of globalization and the subsequent integration of the global markets this paper captures the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts. This study covers New York Stock Exchange (NYSE), Hong Kong Stock exchange (HSE), Tokyo Stock exchange (TSE), Russian Stock exchange (RSE), Korean Stock exchange (KSE) from various socio-politico-economic backgrounds. Both the Bombay Stock exchange (BSE) and the National Stock Exchange of Indian Limited (NSE) have been used in the study as a part of Indian Stock Market. The time period has been divided into various eras to test the correlation between the various exchanges to prove that the Indian markets have become more integrated with its global counterparts and its reaction are in tandem with that are seen globally.

Keywords: Stock Market, Comparative Analysis, Statistical analysis, Efficiency Test.

1. Introduction

The Indian stock exchanges hold a place of prominence not only in Asia but also at the global stage. The Bombay Stock Exchange (BSE) is one of the oldest exchanges across the world, while the National Stock Exchange (NSE) is among the best in terms of sophistication and advancement of technology. The Indian stock market scene really picked up after the opening up of the economy in the early nineties. The whole of nineties were used to experiment and fine tune an efficient and effective system. The 'badla' system was stopped to control unnecessary volatility while the derivatives segment started as late as 2000. The corporate governance rules were gradually put in place which initiated the process of bringing the listed companies at a uniform level. On the global scale, the economic environment started taking paradigm shift with the 'dot com bubble burst', 9/11, and soaring oil prices. The slowdown in the US economy and interest rate tightening made the equation more complex. However after 2000 riding on a robust growth and a maturing economy and relaxed regulations, outside investors- institutional and others got more scope to operate. This opening up of the system led to increased integration with heightened cross-border flow of capital, with India emerging as an investment *'hot spot'* resulting in our stock exchanges being impacted by global cues like never before.

The study pertains to comparative analysis of the Indian Stock Market with respect to various international counterparts. Exchanges are now crossing national boundaries to extend their service areas and this has led to cross-border integration. Also, exchanges have begun to offer cross-border trading to facilitate overseas investment options for investors. This not only increased the appeal of the exchange for investors but also attracts more volume. Exchanges regularly solicit companies outside their home territory and encourage them to list on their exchange and global competition has put pressure on corporations to seek capital outside their home country. The Indian stock market is the world third largest stock market on the basis of investor base and has a collective pool of about 20 million investors. There are over 9,000 companies listed on the stock exchanges of the country. The Bombay Stock Exchange, established in 1875, is the oldest in Asia. National Stock Exchange, a more recent establishment which came into existence in 1992, is the largest and most advanced stock market in India is also the third biggest stock exchange in Asia in terms of transactions. It is among the 5 biggest stock exchanges in the world in terms of transactions volume.

Origin of various stock exchanges:

The origin of the New York Stock Exchange (NYSE) is dated back to May 17, 1792, when the Buttonwood Agreement was signed by twenty-four stock brokers outside of 68 Wall Street in New York under a buttonwood tree. Also called the "Big Board", it is the largest stock exchange in the world in terms of dollar volume and second largest in terms of number of companies listed. The Tokyo stock exchange was established on May 15, 1878 and trading began on June 1, 1878. In 1943, the exchange was combined with ten other stock exchanges in major Japanese cities to form a single Japanese Stock Exchange. It is the second largest stock exchange market in terms of monetary volume and currently has 2302 listed companies. The Hong Kong stock exchange is the 8th largest stock exchange in the world in terms of Market capitalization. The Hang Sang Index (HIS), was started on November 24, 1969. The Russian stock exchange was established in 1995 by consolidating the separate regional stock exchanges into one uniformly regulated trading floor. The Korea stock exchange was created by the integration of the three existing of the Korean Spots and Futures exchanges (Korean stock exchange, Korean futures exchange & KOSDAQ) under the Korea Stock and Futures Exchange Act.3.5. In this paper, the names of the countries and the names of the indices of those countries have been used interchangeably. Thus, the names of the countries represent the indices for the purpose of analysis and they need to be interpreted that way. Again, all the analyses have been done with the closing prices. The following table gives the country and the exchange with the name of its indices.

Country	Stock exchange name	Indices name
India	National Stock Exchange	S & P Nifty
India	Bombay Stock Exchange	Sensex
Hong Kong	Hong Kong Stock Exchange	Hang Seng
USA	New York Stock Exchange	NYSE
Korea	Korean Stock Exchange	KRX 100
Russian	Russian Stock Exchange	RTS Index

2. Past Studies

Poshakwale, Sunil (2002) examined the random walk hypothesis in the emerging Indian stock market by testing for the nonlinear dependence using a large disaggregated daily data from the Indian stock market. The sample used was 38 actively traded stocks in the BSE National Index. He found that the daily returns from the Indian market do not conform to a random walk. Daily returns from most individual stocks and the equally weighted portfolio exhibit significant non-linear dependence. This is largely consistent with previous research that has shown evidence of non-linear dependence in returns from the stock market indexes and

individual stocks in the US and the UK. *Noor, Azuddin Yakob, Diana Beal and Delpachitra, Sarath* (2006) studied the stock market seasonality in terms of day-of-the-week, month-of-the-year, monthly and holiday effects in ten Asian stock markets, namely, Australia, China, Hong Kong, Japan, India, Indonesia, Malaysia, Singapore, South Korea and Taiwan. He concluded that the existence of seasonality in stock markets and also suggested that this is a global phenomenon.

Linkage patterns:

Masih, M.M. Abul and Masih, Rumi (1997) examined the dynamic linkage patterns among national stock exchange prices of four Asian newly industrializing countries - Taiwan, South Korea, Singapore and Hong Kong. The sample used comprised end-of-the-month closing share price indices of the four NIC stock markets from January 1982 to June 1994. They concluded that the study of these markets are not mutually exclusive of each other and significant short-run linkages appear to run among them. *Lau, S T and Diltz, J.D.* (1994) studied the transfer of information among Tokyo and New York stock exchanges. *Agarwal, R N* (2000) examined the financial integration of capital markets in developing nations gave insight with regards to the methodology and the area of study followed.

In a similar study by *Bae, K, Cha, B, and Cheung, Y* (1999) the researchers tried to show the information transmission mechanism that operates for stocks which are dually listed. This has helped in understanding the channel of transmission of information that makes the exchanges dependant on each other.

3. Problem

Presently, the fluctuations in the Indian market are attributed heavily to cross border capital flows in the form of FDI, FII and to reaction of Indian market to global market cues. In this context, understanding the relationship and influence of various exchanges on each other is very important. This study that compares global exchanges which are from different geo-politico-socio-economic areas. With the cross border movements of capital like never before in the form of FDI and FII, coupled with the easing of restrictions bringing various stock exchanges at par in terms of system and regulations, it can be assumed reasonably that a particular stock exchange will have some impact on other exchanges.

4. Objectives

The main objective of this study is to capture the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts. The aim is to help the investors (current and potential) understand the impact of

important happenings on the Indian Stock exchange. This is especially relevant in the current scenario when the financial markets across the globe are getting integrated into one big market and the impact of one exchange on the other exchanges. In other words, the intention is to test the hypothesis, 'whether various stock exchanges globally have any impact on each other' or they are correlated in any way with regard to their movements and, if so, to what extent. Arising out of the main hypothesis is the question - given the above context: What impact would the result have on the understanding that international diversification of investment is desirable and profitable with regard to both risk and return?

5. Methodology

For the comparative analysis of the different stock exchanges, the period chosen is from 1st January 1995 to 31st July, 2006. This period is divided into different sets of years, like 1995-97, 1999-01, 2001-03, and 2003-06, in order to capture the effect and movement of stock exchanges with each other during different periods. The economic situation changes during different times. 1995-1997 period represents the East Asian miracle and crisis period, 1999-2001 represents technology boom and tech bubble bursting period, 2001-2003 represents the slow global recovery from the recession, 2003-2006 period represents the investment boom period especially in the developing and emerging markets. The world is divided into four main regions, namely, the US, Euro region, India and Asian region. Stock exchanges representing various regions used in this study include NSE (India), NYSE (USA), Hang Seng (South East Asia), Russian Stock Exchange (Russia), Korea (Asia). The number of sample units for this study is five.

Comparative Analysis

This is the main part of the study wherein the various stock exchanges of the sample have been compared on certain parameters, both qualitatively and quantitatively.

Qualitative Analysis

In this section the various stock exchanges have been compared on the following parameters;
1. Market Capitalization
2. number of listed securities
3. listing agreements
4. circuit filters
5. settlement

These parameters are used to look at selected important aspects of any stock exchange, viz., the market capitalization gives an idea about the size of the respective exchanges; whereas

the number of listed securities acts as an indicator for the volume and liquidity of any exchange. The listing agreements take care of the governance issue, while circuit filters give an insight into the risk management framework of the said exchange. Finally, the efficiency of a stock exchange has been measured in terms of its settlement process.

Market Capitalization

Market capitalization is the measure of corporate size of a country. It shows the current stock price multiplied by the number of outstanding shares. It is commonly referred to as Market cap. It is calculated by multiplying the number of common shares with the current price of those shares. This term is often confused with **capitalization,** which is the total amount of funds used to finance a firm's balance sheet and is calculated as market capitalization plus debt (book or market value) plus preferred stock. While there are no strong definitions for market cap categorizations, a few terms are frequently used to group companies based on its capitalization. The table below shows the market capitalization of various stock markets in the world.

Table 3.1 World stock Markets and their market capitalization

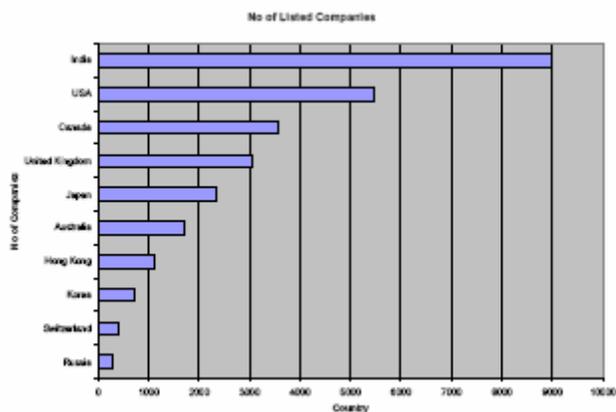| Worldwide Stock Markets			
Source: ETIG			
S. No	Country	Market cap (US$ billion)	% of world
1	USA	15,517	39.5
2	Japan	4,079	10.4
3	United Kingdom	3,067	7.8
4	France	1,828	4.7
5	Germany	1,256	3.2
6	Canada	1,239	3.2
7	Hong Kong	1,001	2.6
8	Switzerland	872	2.2
9	Italy	788	2
10	Spain	688	1.8
11	Australia	687	1.8
12	Russia	592	1.5
13	South Korea	557	1.4
14	India	506	1.3
15	Taiwan	475	1.2
16	Others	6050	15.4
	Total	39,202	100

Based on the above study, it can be observed that India is 15th in the world ranking of Market capitalization. This is in spite of having the third largest investor base, after Japan and USA,

and having the largest number of companies listed. United States leads the list of countries with the highest market capitalization. It is interesting to note that the total market capitalization of all the companies listed on the New York Stock Exchange is greater than the amount of money in the United States. As mentioned earlier, the above data pertain to the year 2005. The individual and global economy has grown since then. As on March 2006, the global market capitalization for all stock markets was $43600 billion.

Listed Securities

Listing in a stock exchange refers to the admission of the securities of the company for trade dealings in a recognized stock exchange. The securities may be of any public limited company, Central or State Government, quasi-governmental and other financial institutions/corporations, municipalities, etc. Securities of any company are listed in a stock exchange to provide liquidity to the securities, to mobilize savings and to protect the interests of the investors.

India has the highest number of companies listed in the stock market. Out of this, about 75 % of the companies are listed with the Bombay Stock Exchange. After India, United States has the highest number of companies listed.

Indices

Parameters	BSE	NSE	NYSE	Tokyo stock exchange	Hong Kong stock exchange	Korea Stock exchange
Name	SENSEX	NIFTY	Dow Jones Industrial Average	NIKKEI-225	Hang Seng	KOSPI
No of Companies	30	50	30	225	33	
Method of calculation	Free Float market capitalization method	Weighted Average	Weighted Average method	Price Weighted Average	Weighted Capitalisation stock market method	Market Capitalisation bassed method

Listing Agreements

Bombay Stock Exchange

Eligibility Criteria for IPOs/FPOs: Companies have been classified as large cap companies and small cap companies. Company with a minimum issue size of Rs. 10 crores and market capitalization small cap company is a company other than a large cap company.

Parameters	Small Cap Companies	Large Cap Companies
Min post issue paid up capital	3 Crores	3 Crores
Min Issue size	3 Crores	10 Crores
Min Market capitalization	5 Crores	25 Crores
Min Public shareholders		1000
Min Turnover		3 crores in the preceding 3 yrs

National Stock Exchange

Eligibility Criteria for New companies (IPOs)

Paid Up capital: Not less than 10 Crores

Market Capitalisation: Not less than 25 Crores

At least three years track record:

- The company has not been referred to the Board for Industrial and Financial Reconstruction (BIFR).
- The networth of the company has not been wiped out by the accumulated losses resulting in a negative networth.
- The company has not received any winding up petition accepted by a court.

- 'Promoters' mean one or more persons with a minimum 3 years' experience of each of them in the same line of business and shall be holding at least 20% of the post issue equity share capital individually or severally
- No disciplinary action by other stock exchanges and regulatory authorities in past three years.

Existing Companies listed on other stock exchanges

Paid up Capital: Not less than 10 Crores

Market Capitalization: Not less than 25 crores.

Minimum Listing Requirements for companies listed on other stock exchanges. The company should have minimum issued and paid up equity capital of Rs. 3 crores. The Company should have profit making track record for last three years.

Minimum net worth of Rs. 20 crores

Minimum market capitalization of the listed capital should be at least two times of the paid up capital.

New York Stock Exchange

Domestic listing on NYSE requires minimum certain minimum standards to be met.

Distribution and Size criteria

Distribution of shares can be attained through U.S. public offerings, acquisitions made in the U.S., or by other similar means.

Round-lot Holders (A) (no of holders of a unit of trading, generally 100 shares) OR	2000
Total Shareholders (A)	2200
Average Monthly Trading Volume (for the most recent six months) OR	100,000 shares
Total Shareholders (A)	500
Average Monthly Trading Volume (for the most recent 12 months)	1,000,000 shares
Public Shares (B)	1,100,000 outstanding
Market Value of Public Shares (B,C) Public Companies IPOs, Spin-offs, Carve-outs & Affiliated Co.	$100 million $60 million

Financial Criteria

Earnings	
Aggregate pretax earnings (D) over the last 3 years	$10 million
Minimum in each of the 2 most recent years	$2 million
Valuation with Cash Flow	
Aggregate Operating Cash Flow(E) over last 3 years	$25 million
Pure Valuation	
Revenues for the Most Recent Fiscal Year	$75 million
Global Market Capitalization (F)	$750 million
REITs (less than 3 years operating history) (B)	
Stockholders' equity	$60 million
Funds (less than 3 years operating history) (B)	
Net assets	$60 million

(A) The number of beneficial holders of stock held in "street name" will be considered in addition to the holders of record. The Exchange will make any necessary check of such holdings that are in the name of Exchange member organizations.

(B) In connection with initial public offerings, spin-offs and carve-outs, the NYSE will accept an undertaking from the company's underwriter to ensure that the offering will meet or exceed the NYSE's standards.

(C) If a company either has a significant concentration of stock or changing market forces have adversely impacted the public market value of a company that otherwise would qualify for an Exchange listing, such that its public market value is no more than 10 percent below the minimum, the Exchange will consider stockholders' equity of $60 million or $100 million, as applicable, as an alternate measure of size.

(D) Pre-tax income is adjusted for various items as defined in Section 102.01C of the NYSE Listed Company Manual.

(E) Represents net cash provided by operating activities excluding the changes in working capital or in operating assets and liabilities, as adjusted for various items as defined in Section 102.01C of the NYSE Listed Company Manual. Average global market capitalization for already existing public companies is represented by the most recent six months of trading history. For IPOs, spin-offs and carve-outs, it is represented by the valuation of the company as represented by, in the case of a spin-off, the distribution ratio as priced, or, in the case of an IPO/carve-out, the as-priced offering in relation to the total company's capitalization.

Tokyo Stock Exchange

Criteria for Listing

The number of shareholders:

- In case where the number of shares to be listed is less than 10 thousand units; 800 persons.
- In case where the number of shares to be listed is 10 thousand units or more but less than 20 thousand units; 1,000 persons,
- In case where the number of shares to be listed is 20 thousand units or more; 1,200 persons.

Number of years since incorporation:

3 years or more have elapsed by the last day of a business year immediately prior to the day of listing application

Amount of profit:

The amount of profit for the first year of the latest 2 years was 100 million yen or more; and 400 million yen or more for the latest year, or

The amount of profit for the first year of the latest 3 years was 100 million yen or more; 400 million yen or more for the latest one year of the latest 3 years; and the aggregate amount of profits for all of the latest 3 years was 600 million yen or more.

Hong Kong Stock Exchange

Basic Listing Requirements for Equities

- Profit attributable to shareholders: At least HK$50 million in the last three financial years
- Market Capitalisation: At least HK$200 million at the time of listing
- Revenue: At least HK$500 million for the most recent audited financial year
- Cashflow: Positive cashflow from operating activities of at least HK$100 million in aggregate for the three preceding financial years

Spread of Shareholders:

- 100 shareholders for issuers with 24 months of active business pursuits.
- 300 shareholders for issuers with 12 months of active business pursuits.

Public float:

- At least 25% of the issuer's total issued share capital must at all times be held by the public.

Korea Stock Exchange

<u>*Quantitative Requirement*</u>

No of Shares: At least 1million shares as of application date.

Net Worth: At least KRW 10 billion as of application date.

Sales Amount: At least KRW 30 billion for the latest fiscal year and the average for the latest three fiscal years should be at least KRW 20 billion.

<u>*Financial Requirement*</u>

Profit: Must show operating profits, ordinary profits and net profits.

Profits for the latest fiscal year should be at least KRW 2.5 billion and the sum for the latest three fiscal years should be KRW 5 billion.

Reserve Ratio: At least 50% (25% for large corporations) according to the balance sheet of the latest fiscal year.

Reserve ratio = [(Net worth - Paid-in Capital) / Paid-in Capital] * 100

No of years since establishment: Have been operating without interruption for at least 3 years since establishment.

Circuit filters

Stock Markets have the dubious reputation of crashing without a warning taking with the savings of numerous investors. *A stock market crash is a sudden dramatic decline of stock prices across a significant cross-section of a market*. Crashes are driven by panic as much as by underlying economic factors. They often follow speculative stock market bubbles such as the dot-com bubble.

The study is restricted to the performance of the Indian Stock market, Japan, Hong Kong, Korean, Russian and the New York Stock exchanges. Hence we will be concentrating on the Asian Financial Crisis, Dot-Com Bubble, and the Russian Financial Crisis etc.

As a counter measure to the instability of the stock market, various measures were introduced by to avoid huge losses. One such solution is circuit breakers. Circuit Breakers are *"a point at which a stock market will stop trading for a period of time in response to substantial drops in value."(11)* They are also referred to as trading curb is certain stock markets like DJIA and NYSE. This was first introduced after Black Monday. *Black Monday is the name given to Monday, October 19, 1987, when the Dow Jones Industrial Average (DJIA) fell 22.6%.(12).* This was done with an aim to avert panic in the market and to avoid panic selling. The Circuit Filters operate according to the rules and requirements of the stock Market in question.

Exchange	Percentage change to trigger circuit breaker
NSE	Market-wide 3 stages-10%,15%,20% of index movement Individual Scrips(depending upon type of scrip) 2%,5%,10% movement of individual scrip
BSE	Market-wide 3 stages-10%,15%,20% of index movement Individual Scrips(depending upon type of scrip) 2%,5%,10% movement of individual scrip
Tokyo Stock Exchange	2 stage-5%,10%
NYSE	3 stage-10%,20%,30%(set every quarter)
Korean Stock Exchange	Single stage-10%

NSE

Index-based Market-wide Circuit Breakers

The index-based market-wide circuit breaker system applies at three stages of the index movement, either way viz. at 10%, 15% and 20%. These circuit breakers, when triggered, bring about a coordinated trading halt in all equity and equity derivative markets nationwide. The market-wide circuit breakers are triggered by movement of either the BSE Sensex or the NSE S&P CNX Nifty, whichever is breached earlier.

• In case of a 10% movement of either of these indices, there would be a one-hour market halt if the movement takes place before 1:00 p.m. In case the movement takes place at or after 1:00 p.m. but before 2:30 p.m., there would be trading halt for ½ hour. In case movement takes place at or after 2:30 p.m., there will be no trading halt at the 10% level and market shall continue trading.

• In case of a 15% movement of either index, there shall be a two-hour halt if the movement takes place before 1 p.m. If the 15% trigger is reached on or after 1:00 p.m. but before 2:00 p.m., there shall be a one hour halt. If the 15% trigger is reached on or after 2:00 p.m., the trading shall halt for the remainder of the day.

• In case of a 20% movement of the index, trading shall be halted for the remainder of the day.

These percentages are translated into absolute points of index variations on a quarterly basis. At the end of each quarter, these absolute points of index variations are revised for the applicability for the next quarter. The absolute points are calculated based on closing level of index on the last day of the trading in a quarter and rounded off to the nearest 10 points in case of S&P CNX Nifty.

In addition to this, there are also price bands for individual securities. Daily price bands are applicable on securities as below:

- Daily price bands of 2% (either way) on specified securities.
- Daily price bands of 5% (either way) on specified securities.
- Daily price bands of 10% (either way) on specified securities.
- No price bands are applicable on scrips on which derivative products are available or scrips included in indices on which derivative products are available.
- Price bands of 20% (either way) on all remaining scrips (including debentures, warrants, preference shares etc). The price bands for the securities in the Limited Physical Market are the same as those applicable for the securities in the Normal Market. For Auction market the price bands of 20% are applicable.
- In order to prevent members from entering orders at non-genuine prices in such securities, the Exchange has fixed operating range of 20% for such securities.

BSE

Scrip wise Price Bands

1. For scrips (53 scrips) on which derivative products are available and scrips which are included in indices on which derivative products are available, there is no circuit filter. However, the Exchange has imposed dummy circuit fitters on these scrips to avoid punching error, if any.

2. Other Scrips which are not included in above-mentioned category have a circuit filter limit of 20%.

Market Wide Circuit Breakers

In addition to the above-stated price bands on individual scrips, SEBI has decided to implement index based market wide circuit breakers system with effect from July 02, 2001.The circuit breakers are applicable at three stages of the index movement either way at 10%, 15% and 20%. These circuit breakers will bring about a coordinated trading halt in both Equity and Derivative market.

The market wide circuit breakers can be triggered by movement of either BSE SENSEX or the NSE NIFTY, whichever is breached earlier. The percentage movements are calculated on the closing index value of the quarter. These percentages are translated into absolute points of index variation (rounded off to the nearest 25 points in case of SENSEX). At the end of each quarter, these absolute points of index variations are revised and made applicable for the next quarter. The absolute points of SENSEX variation triggering market wide circuit breaker for a

specified time period for any day of the quarter is informed by the Exchange through Press Release from time to time.

Tokyo Stock Exchange

There are two circuit breakers which last for only 15 minutes after the price limit is hit. The first circuit breaker takes effect when the price is 5% above or below the previous trading day's settlement price. Another 5% change in the same direction, or a total of 10%, will trigger the second circuit breaker. Limits do not apply to the last 30 minutes of the trading day, unless the 15-minute cooling period spills into that time frame. There are no limits for the last day of trading for the contract nearest to expiry.

NYSE

Trading halts are applied by the New York Stock Exchange ("NYSE") under conditions of extreme market volatility. The circuit breaker trigger points are set at three levels representing 10%, 20% and 30% of the Dow Jones Industrial Average. The levels are calculated by the NYSE at the beginning of each calendar quarter, using the average closing value of the DJIA for the preceding month and each trigger is rounded to the nearest 50 points. For the third quarter 2006, the following triggers are in place.

Level 1 circuit breaker triggered if losses are 10% or 1,050 points

(a) before 2:00 p.m. – halted one hour;

(b) at 2:00 p.m. or later but before 2:30 p.m. – halted 30 minutes;

(c) at 2:30 p.m. or later - trading shall continue, unless there is a Level 2 or 3 halt.

Level 2 circuit breaker triggered if losses are 20% or 2,100 points

(a) before 1:00 p.m. – halted two hours;

(b) at 1:00 p.m. or later but before 2:00 p.m. – halted one hour;

(c) at 2:00 p.m. or later - trading shall halt and not resume for the remainder of the day.

Level 3 circuit breaker triggered if losses are 30% or 3,150 points

(a) at any time - trading shall halt and not resume for the remainder of the day.

Korean Stock Exchange
Daily price change limit

To avoid abnormal price fluctuations caused by imbalance in supply and demand, the KRX-Stock Market places ± 15% of limit that the prices on individual stocks can change during a day, thus preventing fall or rise of the price of individual stock more than 15 percent of the previous day's closing price.

Circuit Breakers

The KSE introduced the Circuit Breakers in December 1998. In order to pacify the over-reaction of investors, when the stock price drops suddenly below certain level (more than 10% of the closing price of the previous day and such situation continues for longer than one minute), the circuit breakers system was introduced on December 7, 1998. The trading, which resumes by periodic call auction where the orders submitted during the first 10 minutes after the trading halt ended, are matched at a single price.

Regulation on program trading

As a measure used to minimize possible impacts of futures market on cash market, thus maintaining the stability of the cash market, when the price of the most active futures contract continues to change 5 % or more than the base price for one minute, execution of all program trading orders in the cash market is delayed for 5 minutes.

Trading Halt

In order to protect investors, when, due to rumors or reports on the matters (e.g., bank defaults, bankruptcy, corporate restructure, etc.) that have major implication on corporate management, sudden and drastic change of trading value and volume is anticipated, the trading of such issues may be halted. In such a case, the concerned corporation is asked to make an inquiry into such rumors or reports and disclose findings.

Hong Kong Stock Exchange

Though a circuit-breaker has not been adopted yet, a two-tier circuit-breaker is being considered, under which trading would stop for half an hour in the event of a 15% fluctuation over the previous day's close, and for one hour in the event of a 25% fluctuation. Another option being considered is an individual circuit-breaker per stock, which would cause a ten-minute open-outcry auction to be initiated every time a stock price varied more than 10% over last day's close.

Trading and Settlement Cycle

This segment takes care of the efficiency issue of the said stock exchange. It basically looks into the speed at which any of the numerous transactions affected in the market gets settled. This is especially crucial given the volume. We see that Indian exchanges are at par with the best in the world when it comes to efficient settlement. It can even go one up if the proposed 'T+1'system is put in place.

Below are the various settlement cycles for the stock exchanges.

Exchange	Settlement cycle
NSE	T+2
BSE	T+2
NYSE	T+3
Korean Stock Exchange	T+2
Tokyo Stock Exchange	T+3
Hong Kong Stock Exchange	T+2
Russian Stock Exchange	T+4

Quantitative Analysis.

The hypothesis that the exchanges impact each other has been tested through various statistical methods with data on price, returns collected from the exchanges. Mainly the correlation analysis, exponential trend analysis and the risk-return analysis has been used to validate the hypothesis.
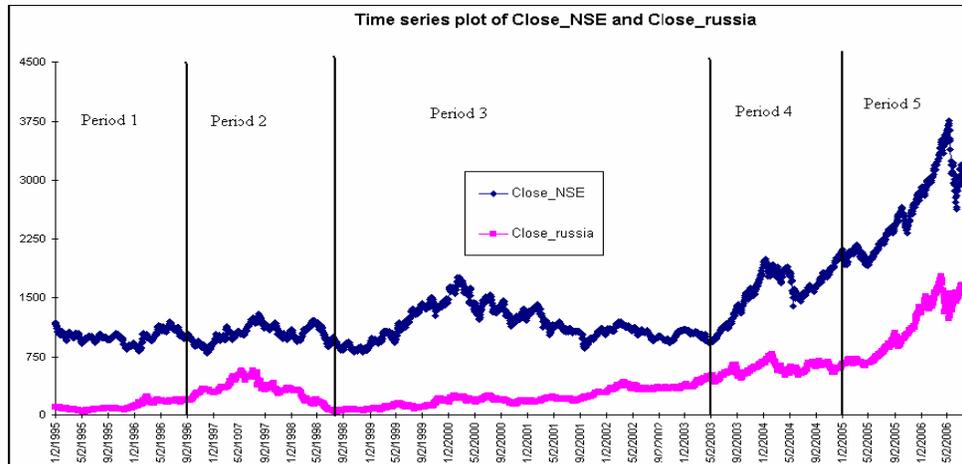
Price Relationship

Correlation is a numerical summary measure that indicates the strength of relationships between the pairs of variables. A correlation is very useful but it has its limitations. That is, it can only measure the strength of a linear relationship. The numerator of the above formula is also a measure of association between two variables X and Y which is called the covariance between X and Y. Similar to correlation, a covariance is a single number that measures the strength of the linear relationship between the two variables. It is by looking at the sign of the correlation or the covariance, i.e. positive or negative, that we can tell whether the two variables are positively or negatively related.

Therefore the correlation is better because, unlike the covariance, the correlations are not affected by the units in which the variables are measured. All the correlations are between +1 and -1, inclusive. The sign determines whether the relationship is positive or negative. The strength of the relationship is measured by the absolute value or the magnitude of the correlation. The closer it is to +1 the stronger the relationship is and the closer to zero indicates that there is practically no linear relationship. At the extreme a correlation equal to1 -1 or +1 occurs only when the linear relationship is perfect. In this part the price data of the various exchanges are collected and subjected to a correlation test in order to find out the influence that they have on each other. In other words, an effort has been made to gain insight into how far the price movements of the exchanges are related with one another.

NSE vs. Russian Stock Exchange

Fig 1.1

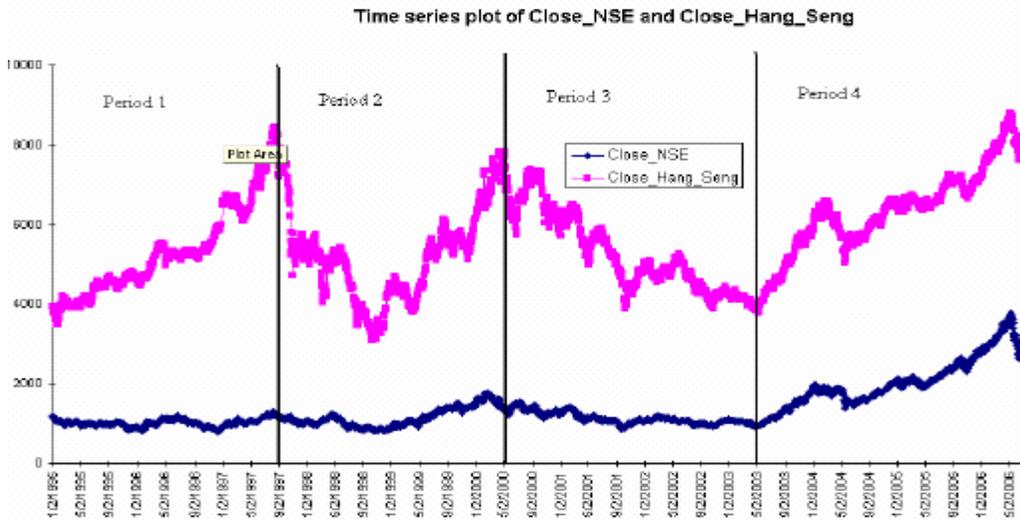Time series plot of Close_NSE and Close_russia

In the above figure, during period 1, the two stock exchanges have moved in a very narrow range. The volatility is much higher in the NSE than in the Russian stock exchange. There seemed to be low connectivity between the two exchanges. In period 2, The Russian stock exchange had seen a peak and also a very heavy drop. But at the same time, NSE did not show so much variation as shown by Russian stock exchange. The Russian stock exchange was awarded as the best performing stock exchange in the year 1997. But the very next year it crashed. The event started with collapse of one of the largest bank in Russia and, for the first time ever, a country defaulted on its government securities. Then the political environment became volatile, which led to the ouster of Boris Yeltsin and then Putin came to power. NSE again moved in a range but showed much higher volatility than the previous period. The Russian market showed the characteristics of a *'grave yard'* market wherein there is so much wealth loss due to decline of the indices that those who are in the market cannot sell off and come out as no one is willing to buy and get into the market at that current scenario. Period 3 saw reversal of roles of earlier period. NSE went up and reached a peak and then came down whereas the Russian stock exchange remained stagnant. NSE rose because of tech boom till mid of 2000. Subsequently it collapsed and went back to its level of 1998 in the year 2001. Till 2003, NSE remained at the level that it attained in the year 1998. But volatility was much higher in this period. Russian stock suffered from the period of stagnation in this period. The stock exchange did not respond at all to the tech boom. After the bubble collapse this exchange started to move up slowly. NSE moved up very sharply responding to the favorable interest rate regimes and other macroeconomic factors. Growth was very sharp in this period

for NSE. Russian stock exchange also rose but marginally. But the volatility is higher which shows that the trading activity has started to pick up. During period 4, both the exchanges rose sharply and moved in an almost identical fashion. Correlation is also very high during this period. This shows a lot more integration of two markets with each other.
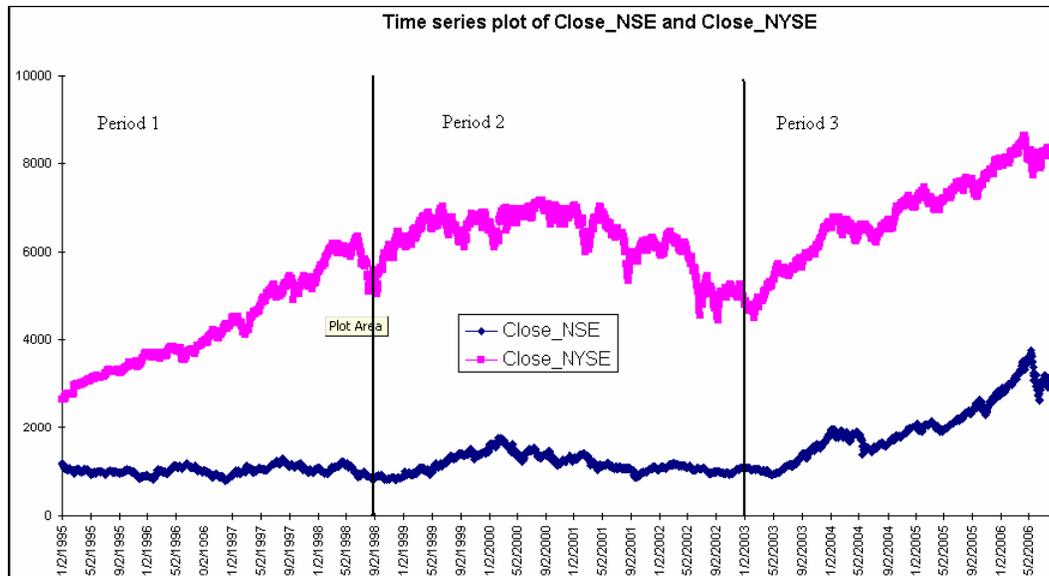
NSE vs. Hang Seng

Fig 1.2

Time series plot of Close_NSE and Close_Hang_Seng

In Fig1.2, period 1 shows that there is almost no correlation between these two exchanges. Hang Seng was rising very sharply because of the East Asian miracle. Whereas India, not part of this success story, remained almost untouched by this boom. NSE is almost constant during this period. During period 2, Hang Seng crashed 50 percent and then rose back 100 percent. Thus, it showed very high volatility during this period. NSE also rose during this period because of pervasive tech boom but the rise was not as spectacular as Hang Seng. Hang Seng might also have risen sharply because of its previous low levels. Period 3, Hang Seng was falling steadily; showing a downward trend. This might be due to the fear of global recession. But the NSE was not much affected. During Period 4, NSE was rising in almost identical manner with the Hang Seng. This shows the larger integration of the Indian economy in the foreign market. This might also be due to the fact that this boom was led by FII and other foreign investors. Hence, NSE is showing higher correlation during this period.
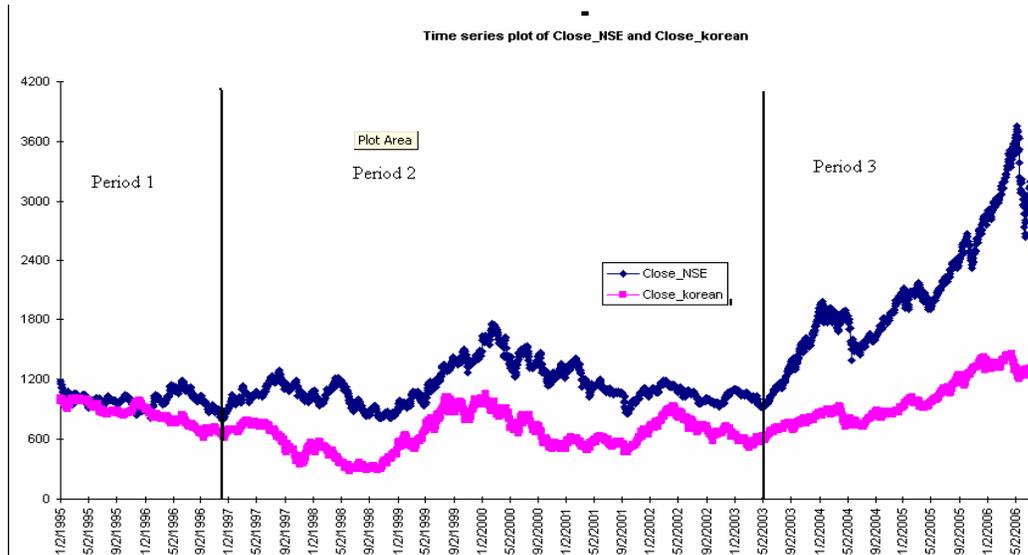
NSE vs. NYSE

Fig 1.3

Time series plot of Close_NSE and Close_NYSE

Here, NYSE was a success story in this period. Led by the tech companies, the US economy was at its pink which is reflected in the NYSE. But the NSE did not appreciate much. In the NYSE the tech boom was saturating. The NYSE did not appreciate much in the initial period. But in the year 1999 and mid of 2000, NSE was rising with the NYSE because India had benefited much from the tech boom in this period along with the NYSE. The high dependence of India on the US in trade was reflected by the two stock exchanges. During this period, both the stock exchanges has risen sharply. Although the percentage change in the NSE was much larger, but the manner in which they were moving was highly correlated.

NSE vs. Korean stock exchange

Fig 1.4

Time series plot of Close_NSE and Close_korean

The above diagram shows that, during 1995, both the stock exchanges were at the same level. But due to East Asian crisis, Korean stock exchange was much more affected because its economy was more integrated with those East Asian economies. During period 2, both the stock exchanges moved in almost identical manner. The returns were almost nearly equal during this period, since both the stock exchanges rose very sharply. But, the rise in the NSE was much sharper. Still, we can say that the two exchanges were moving more or less in same fashion. We have tried to take a look at the impact of various stock exchanges on each other in this section. Therefore, we have divided our time period from 1995-2006 June into sub-sets depending on the happening of certain changes caused by events or policy decisions. This has the purpose of finding out the extent of impact that the markets have on each other.

Table 1

Stock Price Correlation among Stock Exchanges

Year/variables	Korean	Russian	Hong Kong	New York	NSE
1995-1997					
Korean	1.000				
Russian	-0.663	1.000			
Hong Kong	-0.868	0.837	1.000		
New York	-0.878	0.873	0.933	1.000	
NSE	-0.277	0.386	0.421	0.355	1.000
1998-2000					
Korean	1.000				
Russian	0.367	1.000			
Hong Kong	0.603	0.629	1.000		
New York	0.628	0.282	0.657	1.000	
NSE	0.826	0.548	0.810	0.631	1.000
2001-2003					
Korean	1.000				
Russian	0.586	1.000			
Hong Kong	0.171	0.171	1.000		
New York	-0.031	-0.296	0.566	1.000	
NSE	0.395	0.427	0.789	0.467	1.000
2004-2006					
Korean	1.000				
Russian	0.910	1.000			
Hong Kong	0.156	0.399	1.000		
New York	0.952	0.909	0.242	1.000	
NSE	0.925	0.941	0.336	0.931	1.000

Table 1:

The period **1995-97**, characterized by the South East Asian currency crisis and other economic events, did not have integration of different markets at high levels. This is especially true in case of India. Our country was in its inception stage as a globalized economy and hence distinctly protected from foreign exposure. The capital market was slowly evolving at that point of time, putting systems in place. That is to say, India had only limited foreign exposure which somewhat insulated the country's economy from foreign economic upheavals. This is

clearly reflected in the following table of correlations which clearly shows that, in that period, very little correlation was existent among the exchanges. This signifies that the impact of other exchanges was negligible on the Indian capital markets. The almost non-existent effect of the South Asian Currency crisis, which affected Korea, on the Indian market validates our observation. The correlation shows negative for Korean exchange. During the period 1998-2000, Indian economy faced a recession as well as a period of heightened business activity. Mainly, the capital market started to consolidate across the globe. This is reflected by increasing impact of various exchanges on the NSE. The point to note is that it is mainly the Asian markets that have started impacting the NSE. The Korean market started to cast its effect along with the Hong Kong market. This maybe because a lot of MNCs made their Asian base in those two countries and they also operated in India, hence the impact.

The period **2001-03** faced another major economic dampener in the form of the 9/11 attacks in USA. This left the world economy in a state of shock. As could be expected, the economies across the globe faced recessionary situation. However, this time also, except for the Hong Kong bourses, none else had any significant impact on the Indian counterpart. **2004-06** is termed as the period when the various world markets started to converge. In the global scenario also, we find that the economies facing downturn were making a comeback – Japan and USA. Our expectation to find high level of impact of other markets on Indian market gets validated as shown by the significant correlation figures in the table. However, one thing to notice is the lessened impact of the Hong Kong market on the Indian market which, going by the past trend, comes as a surprise. This maybe due to easing of restrictions which previously insulated the economy from foreign exposures. The increased cross border flow of capital also contributed to this phenomenon.

Exponential Trend

In contrast to a linear trend, an exponential trend is appropriate when the time series changes by a constant percentage (as opposed to a constant amount) each period. One important characteristic of exponential trend is that, if a time series exhibits an exponential trend, a plot of its logarithm should be appropriately linear. This equation can be interpreted that the coefficient b is approximately the percentage change per period.
Whenever there is a time series that is increasing at an increasing rate or decreasing at a decreasing rate, an exponential trend model proves apt.

In this context, the method has been used to understand the trend existing in the movement of the exchanges and whether the trends have commonality. In other words, an attempt has been made to find whether two or more exchanges follow the same pattern in their movements of price and, if so, to what extent they are related.
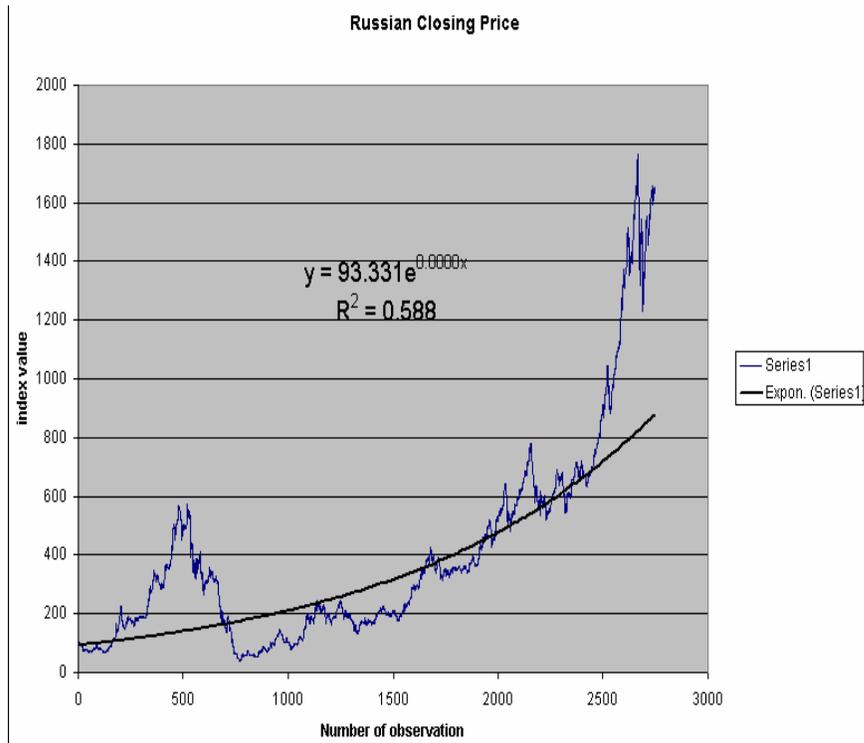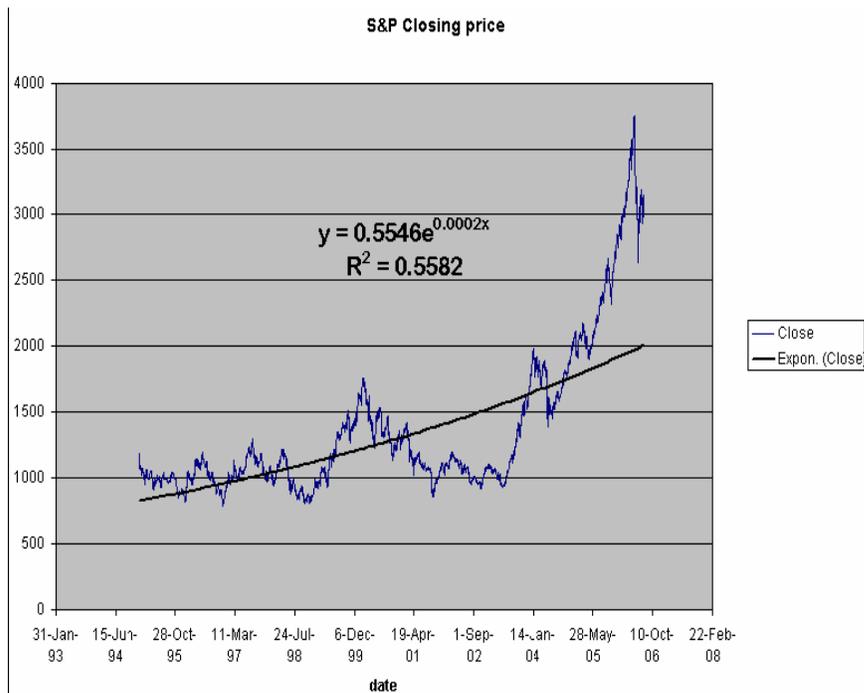
Fig 2.1

Russian Closing Price

$$y = 93.331e^{0.0000x}$$
$$R^2 = 0.588$$

Fig 2.2

S&P Closing price

$$y = 0.5546e^{0.0002x}$$
$$R^2 = 0.5582$$

Fig 2.3

NYSE Closing Price

$y = 9.5317e^{0.0002x}$
$R^2 = 0.6135$

CLOSING PRICE
Expon. (CLOSING PRICE

Fig 2.4

Closing Price of Hang Seng

$y = 186.1e^{9E-05x}$
$R^2 = 0.13$

Closing Price
Expon. (Closing Price

Fig 2.5

Korean Closing Price

$$y = 640.31e^{1E-04x}$$
$$R^2 = 0.0756$$

Legend: Closing, Expon. (Closing)

X-axis: Observation representing date from 1995-2006
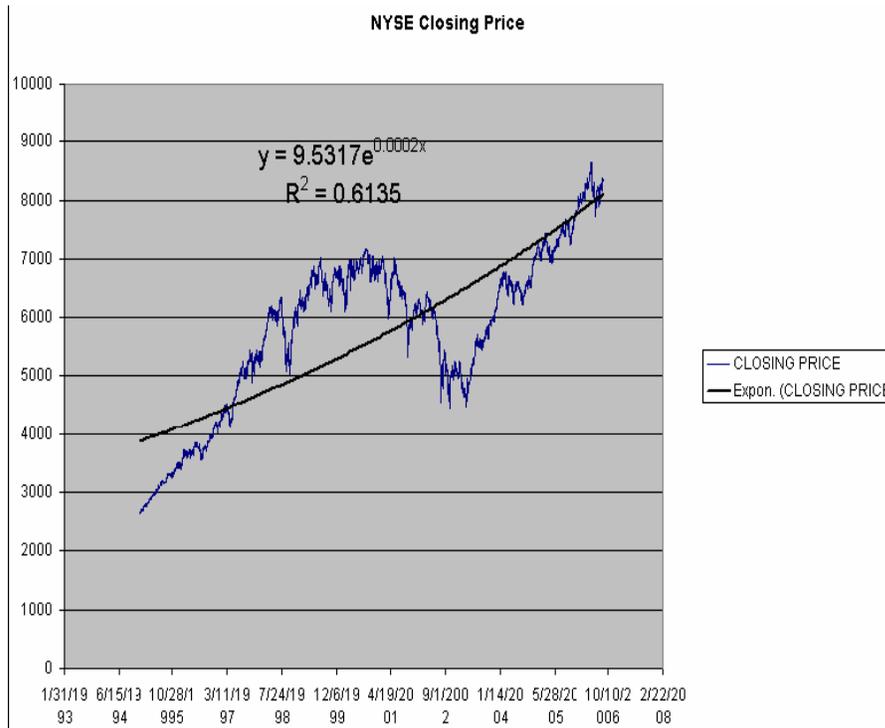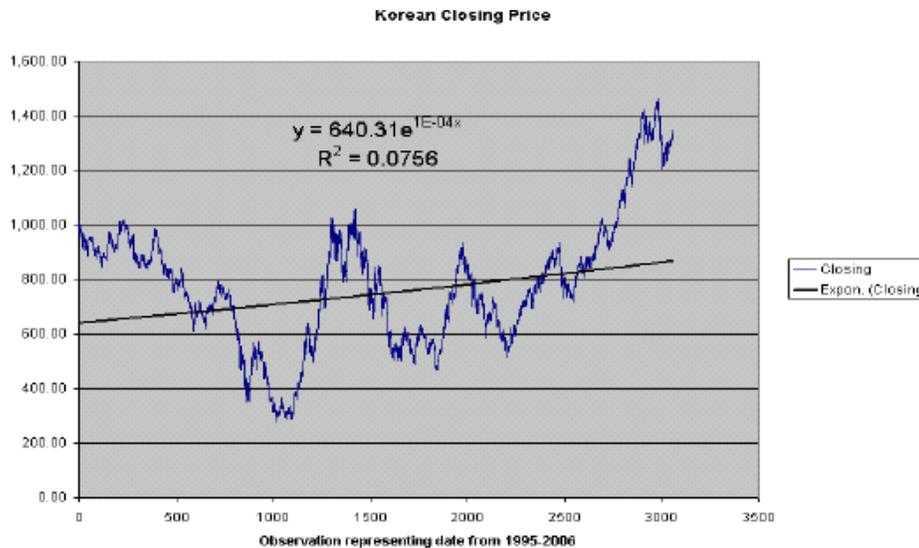
In the above figures, it can be seen that NSE seemed to follow the exponential trend quite reasonably before the technology boom had hit the Indian stock market in the year 2003. After that NSE has much larger rise which could not be captured in the exponential trend. Russian stock exchange has also been explained by the exponential trend method quite reasonably before year 2003. Exponential trend has been able to capture the trend quite well the changes in NYSE. R-square value is around 0.6135. This shows that the model is able to explain the 60% of the variations of the index. For, both the stock exchanges of Korea and Honk Kong have shown very high volatility over this period and have not risen consistently enough. Thus exponential trend line is not able to explain the price behavior of these exchanges satisfactorily. The R-square values are very low 0.07 and 0.13 for Korean and Hang Sang respectively.

Risk and Return

This section tries to compare the various exchanges on the basis of returns and the corresponding risks associated with it, returns being, perhaps, the single most important factor affecting the performance of any index. While risk can be termed as the major factor underlying all activity, it becomes imperative to compare the exchanges based on this parameter. Table 2 exhibits the historical risk-return figures of the exchanges. From the return perspective, NYSE seems to be most stable among all of these stock exchanges. There are only two years when NYSE has given the negative returns, i.e. in the years 2001 and 2002. Russian stock exchange is the most volatile of all these and has given returns from 108% to -194%. NSE seems to have followed or moved in tandem with the NYSE more after year 2000. Hang Seng

exchange follows long cycles. If returns turn negative, they remain negative for two or three years. Similarly if return turns positive, then they remain so again for two or more years.

Year / variables	NSE		Hong Kong		New York		Korean		RSE	
	risk	return	risk	return	Risk	return	risk	Return	risk	return
1995	60.1	-26%	323.5	20%	240.4	27%	40	-14%	10.1	-19%
1996	100.4	-1%	418.7	30%	193	17%	71.4	-31%	47	83%
1997	82.4	14%	905.1	-20%	411	27%	108.3	-55%	93.5	62%
1998	115.4	-20%	637.9	-20%	328.4	15%	88.2	38%	114	-194%
1999	184.0	51%	784.0	54%	220	9%	156.8	56%	24.7	108%
2000	157.2	-23%	521.8	-18%	218.2	3%	143.8	-74%	24.5	-22%
2001	129.2	-17%	659.8	-21%	374.9	-8%	48.1	29%	23.9	69%
2002	67.7	4%	336.5	-17%	560	-22%	80.0	-14%	32.4	29%
2003	254.2	54%	654.9	36%	480.3	22%	84.2	24%	81.3	45%
2004	159.0	8%	371.2	9%	229.5	12%	53.1	9%	55.6	-14%
2005	263.5	29%	278.3	7%	230.7	8%	136.3	43%	155.0	62%
2006	252.3	10%	335.0	15%	182.2	5%	60.3	-3%	128.9	31%

Russian stock exchange has shown the least variation and hence appears to be least risky. But actually there is very less trading in the Russian stock market during the period of 1999 to 2003 due to stagnation and political instability and uncertainties about economy.

Risk Return Comparison

Table 2:

Korean stock market is also very stable form the standard deviation angle. But this market has also not much appreciated over these years and it remains more or less range- bound. Hang Seng has shown the highest volatility as it is a much traded stock exchange. Also, the events like East Asian crisis have also affected the volatility of this exchange. But, nevertheless, the volatility has reduced in the recent years than it has in the period 1997-1999. Yet, it is more volatile than the other stock exchanges that we have compared. NYSE is a mature and most stable market of all these. The volatility has remained more or less constant over the years. The volatility of the NSE has risen steadily over these years as the trading and market capitalization of the companies has increased. Now the volatility of NSE is almost at par with the other exchanges.

Conclusions

The study brings forth some distinct conclusions many of which validate popular beliefs. The objective of the whole research was to try and compare the various stock exchanges based on certain parameters in order to understand the impact of integration of the financial world on the various entities within it especially in the context of globalization and increased interest in the capital markets fuelled by surging growth.

The various research papers that have been studied traced the gradual *'coming of age'* of the Indian stock market over the past decade without actually arriving at any conclusive evidence on the comparative position of our stock exchange with that of other global ones. The studies mainly looked at various aspects of efficiency in the stock market on a stand alone basis and tried to draw conclusion regarding the state of our maturity. However, we have tried to use the comparison method to benchmark the performance of our stock market with that of a selection of global stock exchanges on the basis of their diversity with respect to geo-socio-politico-economy.

With regard to the initial hypothesis of this study, it is clearly found that the stock markets do impact each other, more so in the recent times, i.e. post-2000. This has been due to the fact that *'cross holdings'* are increasingly becoming common wherein the geographical barrier is dissolving with respect to investing. In India also, deliberations are on to *'cross list'* Indian shares in Asian exchanges to start off. This will increase the degree of integration manifold. Moreover, the automation of the exchanges has played a vital role in making the financial markets integrated. In this context, the pioneer is the Swiss exchange, followed by Brussels as an early adapter. The spate of *'ADR'*s and *'GDR'*s, along with the increased opening up of various economies, increasing foreign trade and the rise of the *'MNC'*s have contributed immensely to the integration process. It leaves us with the conclusion that the strategy of globally diversifying investments is slowly losing its profitability. Especially after 2000, the markets are fast converging. It has now become a global market operating 24 hours, with opening of markets in different time zones at various points of time appearing to be seamless. Thus, in hindsight, it would not be an exaggeration to say that the impact of the South East Asian currency crisis, if happened today, would have much more drastic effect on India, as the country is more in sync with the global markets. Actually, it can be said that, in the current scenario, any apprehension about stocks in one country can escalate into a panic selling. However, a caveat needs to be put here with respect of the attractiveness of the global diversification strategy. In a way, though the attractiveness of the strategy is gradually diminishing, it can still be profitably used for investing in countries whose stock exchanges do not yet have high correlation amongst each other. Moreover, although the stocks listed in the stock exchanges of the sample in this study do impact each other and move in tandem, the

magnitude of that movement as a result of reacting to global cues varies and, to that limited extent of variation, the global diversification strategy can prove useful. In short, the *'transaction cost'* for investment is coming down as is *'informational cost'*.

Qualitatively, the comparison showed that Indian stock exchange has the governance system and an efficient mechanism in place to be a world class institute, specially the requirements of Clause 49 promulgated by SEBI and the advanced trading and settlement mechanism of NSE, respectively. However, unfortunately our implementation of the same remains a problem area with almost 15-20% of the listed companies yet to align their operations as required under the law.

Moreover, there are also issues regarding the extent to which the sophisticated systems of the stock exchanges (NSE, BSE) are utilized in terms of the volume and frequency of transactions and the range of instruments traded. The commodity segment, derivatives and such other segments are yet to see activities like the equity segment of the market. The reasons that can be attributed to this is the fact that it has been only 5 years (derivatives started in 2000) that the various segments, apart from equity and debt, have started operating and hence it is reasonably nascent compared to its global counterparts. It would, therefore, not be unjustified to say that the system is still evolving and it would take some time not only to attain efficiency of operation, but also to generate increased interest and awareness about the various other segments of the market. Then only can we expect the operations to match its global counterparts in terms of volumes, frequency and variety of instruments traded.

One more reason that can be attributed for the lag between a global benchmark like NYSE and BSE or NSE can be the fact that, in our country, listing of foreign companies are still not allowed on the lines of ADRs or GDRs. This can be due to lack of depth and breadth of the market. Again, as this study points out, the listing criteria differ in terms of size as well as their disclosure norms. This implies that the depth of the market judged by the total capitalization is less for the Indian markets compared to its counterparts. Moreover, the disclosure norms affect the governance aspect as also the information availability.

Innovative financial instruments like CAT Bonds, or dealing in Junk Bonds as a cheap source of finance or sophisticated derivative instruments are yet to catch up in our country. This is partly because of the regulations that are gradually being eased out and also due to the risk appetite of the investors in this country. The opening up of the economy and its subsequent impact on the financial sector has only started barely in the last six years and, hence, the *'teething problems'* of initial skepticism, lack of awareness and interest exist, besides cautious approach towards bringing about changes with keenly monitored impact of those changes.

If we go to the specifics, then we find that the Clause 49, our counterpart of the famed Sarbannes-Oxley Act of USA, has brought us to the global standards. But, because of the early

stages (only a year), the implementation is causing a hindrance in attaining the requisite level with regard to governance. Again the risk management system in our country is very elaborate and the mechanism in place is very efficient as also effective. It actually matches the level of a well established benchmark like NYSE. However, the only difference is in terms of risk appetite of the investors which causes the level and operation of 'circuit breakers' to vary.

However, Indian stock market is very much at the same pedestal and, in fact, better than most of its Asian counterparts especially the emerging economies. Indian system enjoys creditability even when compared with a stock exchange like Nikkei (Japan).

If we look at the efficiency of trading captured by the 'trading and settlement' mechanism, then we have found that the Indian mechanism is faster than the NYSE and at par with the best in the world. In fact, it is one of the fastest.

One problem area that came out as a possible barrier in the path of Indian stock exchanges attaining global level is the fact that India has a very low rank in terms of market capitalization (ranked 14th). All other stock exchanges that we used in our study rank above Indian stock exchange. This is in spite of the fact that Indian stock exchanges have the highest number of companies listed (around 9000) and BSE accounting for almost 75%. Therefore, volume-wise, Indian market is still pretty small.

One more aspect that we have tried to look at in this study is the extent of influence the various stock markets cast on each other, specifically the impact of other stock exchanges on their Indian counterpart. In order to understand, we divided our study period in parts based on certain events that had economic implications. Here, we found the results validating popular belief that the markets in general and Indian market in particular became more integrated with other global exchanges from 2002-03. This can very well be seen since the South Asian crisis of the mid-late nineties barely affected us, particularly because we were insulated due to government policies and were just making the transition. However, in the later time periods, the influence of other stock markets increased on BSE or NSE but at a very low - almost insignificant - level. At the time of crucial 9/11, NYSE had started to exert its influence on us but at lower levels and, though the economic downturn impacted, it did not last long. The increased trend of Indian companies going for ADR and GDR issues has also contributed as a channel for information transfer between the exchanges where the particular company is listed. This has not only facilitated the integration process, but also increased the sensitivity of the home country's stock exchange to the movements of various other exchanges especially where the home company is listed.

To sum up:

Finally, we can sum up with the following observations:

- The markets have indeed started to integrate and Indian market is no exception especially after 2002-03.

- The regulatory authorities must remove any ambiguity that may be existing when compared to the regulations of other exchanges before they can actually make the grade.

- Lastly, although it has to be accepted that the market is evolving but the Indian system has already attained the minimum level of robustness and efficiency to be counted among the best in the world and stand equipped to attain higher sophistication as well as heightened activities. As for the existence of any signals or patterns among the stock exchanges, it can safely be said that the markets do react to global cues and any happening in the global scenario be it macro economic or country specific (foreign trade channel) affect the various markets.

In short, the Indian exchanges are ready to make the transition should the government decides to further relax the regulations and open up. The financial sector as a whole, with the stock markets as its indicator, has indeed come a long way and are ready for the next level with regards to efficient trading and variety in the instruments traded.

Thus this study validates the popular belief that the markets in general and Indian market in particular is more integrated with other global exchanges from 2002-03 onwards. This can very well be seen since the South Asian crisis of the mid- late nineties barely affected us particularly because we were insulated due to government policies and was just making the transition. However, in the later time periods, the influence of other stock markets increased on our BSE or NSE, but at a very low almost insignificant level. At the time of 9/11 incident, NYSE had started to exert its influence on us but at lower levels and hence the economic downturn did not impact for long. The increased trend of Indian companies going for ADR and GDR issues has also contributed as a channel for information transfer between the exchanges where the particular company is listed. This has not only facilitated the integration process but also increased the sensitivity of the home country's stock exchange to the movements of various other exchanges especially where the home company is listed. As for the existence of any signals or patterns among the stock exchanges, it can safely be said that the markets do react to global cues and any happening in the global scenario be it macro economic or country specific (foreign trade channel) affect the various markets.

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