Determinants of Indian Stock Market

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Abstract: *Stock markets exhibit dramatic movements and stock prices appear to have huge volatility justified by the fundamental changes in the market. Stock market prices are the chain of reaction as the news arrival in one nation will lead to change in global market conditions. Direction of volatility is driven by the expectations of the investors and traders. We hypothesize the magnitude of price dependency of foreign exchanges with Nifty. Indian stock markets are also driven by other forces like foreign capital inflows - outflows and also crude oil prices. In light of this, our study focuses on looking at as well as determining what drives the Indian stock market (proxied by NIFTY 50).*
Keywords: *NIFTY 50, oil prices, foreign exchange*

I. Introduction:-

Interdependency of financial markets has been increased very widely in the recent past. All the domestic markets are now integrated due to wide computerization of global market. Modern technology has reduced the isolation of domestic markets performance. We are buying and selling from and to every country by a click of the mouse, thus one would expect inter-dependency in such a hyper-connected world. Again, one important point of notice is, that this inter-dependency is not egalitarian, countries with large economy size, higher trade flows, tend to have a greater influence than the others. Some of the key global market indices that have an impact on the Indian markets are- S&P 500, NIKKEI, FTSE100, SHANGHAI COMPOSITE INDEX etc. Apart from these, there are also factors such as Oil prices, Currency Rates, which impact the Indian Stock market. We attempt to objectify this relationship in this paper. Needless to say, political power has followed economic power. Consequently, the powerful economies of North America, Western Europe, and South East Asia hold sway on global cues more often than not. For example, when the Greek crisis took a toll on the Euro valuations, it left a clear impact on the global money markets, on the other hand, the Zimbabwean Dollar has faced many years of hyperinflation, but we haven't heard anyone fretting over it. As an investor or even a stock market analyst it becomes vital to study the linkages between Global Indices and Indian markets on a granular level. Every sector in the Indian market tends to have an important driver abroad.

II. Present Scenario

The last one year for the NIFTY 50 index has been nothing short of a roller coaster ride. The index touched 9,000 levels for the first time as well as the 10,000 level for the first time in the same year i. e, 2017. After its launch in April 1996, NSE NIFTY-50 took 21 years to rise from 1,000 to 10,000, returning 11.6% per year (CAGR). In the past, rapid per capita GDP growth was almost always propelled by rapid export growth. Economic advantage is now with the countries like Peru and Indonesia where the exports are relatively low. Fortunately for India, it is also among that latter group. However, in present scenario of Indian market of people, trade and money Indian industries are not into outsourcing.

The false boom before 2008 which drove the economy is now over. Population growth is slowing in most countries, and this has a direct impact on economic growth. It helps to explain why the number of economies growing faster than 7 per cent a year fell from more than 50 before 2007 to just six in 2016. These six were mostly small, poor countries like Ivory Coast and Tanzania. India was the only large one if you believe the official GDP data. It is not easy for a developing country like India to grow at a rate of 8 or 9 percentage in post crisis world. The biggest global risk has slipped a bit below the radar: China, the Land of Bubbles. China continues pumping out debt with more and more going to waste. Financial risks popping up everywhere, most recently in obscure commodities like garlic and glass. The longer this trend grinds on, the more likely the debt driven machine is to stall, and the consensus may be too confident that the economic engineers in Beijing can determine when that moment comes. Chinas increasing debt can risk performance of global economy.

The above three trends clearly outline the fact that we are headed towards another gruelling period of maybe an economic crisis. With growth slowing down, debts mounting everywhere, cries of protectionism growing louder, the conventional method of manufacturing led growth is taking a back seat slowly. In light of this the stock market too is bound to bear the brunt. The major driver of any stock market is the investor

sentiment (namely fear and greed). Having said this, it is definitely difficult to enlist only certain factors, as the ones impacting stock market. However, we in this study have stuck to those which have been consistently and significantly impacting the Indian stock market.

III. Literature review

Authors	Markets	Period	Methodology	Conclusion
Ronald and victor	Tokyo, London, New york	1987-1990	GARCH method	Magnitude of volatility spillover is generally much less in this case.
Janakiramanan and Lamba (1998)	Australia, Hong-Kong, Japan, New Zealand, Singapore, USA, Indonesia, Malaysia, Thailand	1988-1996	VAR model	Countries which are geographically close with strong economic ties appear to be financially interdependent and highly Integrated. The dominant role of The USA market is confirmed.
Masih and Masih (2001)	USA, Britain, Japan, Germany, South Korea, Singapore, Hong-Kong, Taiwan, Australia	1992-1994	Co-integration test	There is interdependency among the Asian markets and the already Developed countries of the OECD. The markets of the USA and Britain have a dominant role both In the short and the long-run.
Bessler	Australia, France. Switzerland, USA, Japan, Canada	Late 90's	VAR model	Stock index price from countries (with exchange rate adjustments to U.S. dollars) are co-integrated
Choudhry (1997)	Argentina, Brazil, Chile, Colombia, Mɛxico, Venezuela, USA	1989-1993	Co-integration test	The markets are co-integrated with or without the presence of the USA which appears to exert dominant Influence.

IV. Data:

Data for the analysis is drawn from various finance applications (investing.com, yahoo finance). Closing data points of last five years are gathered for testing the hypothesis. This study covers 6 stock markets namely (FTSE100, S&P500, NIKKEI, SHANGHAI, NIFTY 50, and CRUDE OIL) to stipulate co-movement between them.

V. Methodology

5.1 The Augmented Dickey Fuller Test (ADF) is done to check the stationarity of the data. Unit roots can create unpredictable results.

The Augmented Dickey-Fuller test can be used with serial correlation. The ADF test can handle more complex models than the Dickey-Fuller test, and it is also more powerful. This unit roots can cause high errors of 1st level.

The hypotheses for the test:
- The null hypothesis for this test is that there is a unit root.
- The alternate hypothesis differs slightly according to which equation you're using. The basic alternate is that the time series is stationary (or trend-stationary).

5.2 Johansen test is used to test co-integration for several time series. This test permits co-integrating several equations.

The hypothesis for the test:-

- The null hypothesis for this test is that there are no co-integrating equations.
- The alternate hypothesis is that there is a co-integrating equation.

5.3 Granger causality is a way to investigate **c**ausality between two variables in a time series. The method is a probabilistic account of causality; it uses empirical data sets to find patterns of correlation.

Causality is closely related to the idea of cause-and-effect, although it isn't exactly the same. A variable X is dependent on variable Y or variable Y is dependent on variable X. However, with Granger causality, you aren't testing a true cause-and-effect relationship.

The hypothesis for the test:-

- The null hypothesis for this test is that there is no granger causality.
- The alternate hypothesis is that there is granger causality that means the probability is less that 10%

The above tests were conducted using the R programming language (find the code attached in appendix)

VI. Analysis

6.1 Augmented Dickey Fuller test-

First part of the analysis involves checking of the stationarity for data available with us as known theoretically non-stationarity leads to erratic trends and unviable analysis. So, stationarity assumes importance for further analysis. It is an essential prerequisite for co-integration tests. We have used the Augmented Dickey fuller test as mentioned before as well. Following is the output

Variable	ADF level test	ADF 1st difference test
Nifty	-0.90	-24.81
Crude oil	-0.87	-25.43
FTSE 100	-2.35	-24.77
S & P 500	-0.93	-24.96
Shanghai	-1.51	-25.74
Nikkei	-2.03	-24.27

(Table-1)

Critical value: - *-3.43 **-2.86 ***-2.57

From the above table it is seen that the data is difference stationary. This satisfies the prerequisite for Johanssen's co-integration test we perform co integration test in order to find evidence for the existence of long run relationship between the indices considered.

6.2 Johanssen's co-integration test

Following is the output of Johanssen's test

Number of hypothesized CE's	EIGEN Test Statistic	Critical Value at 5%
0	48.51	40.3
1	32.61	34.4
2	29.90	28.14
3	10.64	22.00
4	5.77	15.67
5	2.54	9.64

(Table-2)

We have performed the Johanssen's co-integration test for all the six variables. Looking at the table above we get an indication of a weak long run relationship between the indices this is because the null hypothesis of at the most 1 co-integrating equation gets accepted. The absence of a strong long run relationship between these markets tells us there is limited financial integration. This may be due to the fact that economy and industrial structures in these countries differ. Due to this we can observe a weak long run relationship. Further, it indicates that stock prices are not driven by common international risk factor in all the markets. The risk factor tends to be market specific.

6.3 Granger Causality:-

1. Since the indices are difference stationary and the co-integration results are weak, there by negating possibility of robust co-integration, we use further methodology.
2. The granger causality test is now used to identify the relationship amongst this, markets

	F statistic	probability
FTSE 100 does not granger cause NIFTY 50	1.90	0.15
SHANGHAI composite index granger causes NIFTY 50	2.40	0.09

Nikkei does not granger causes NIFTY 50	0.08	0.91
CRUDE OIL does not granger causes NIFTY 50	1.22	0.30
S & P 500 does not granger cause NIFTY 50	0.31	0.73

(Table-3)

The time period for the analysis does not include the crisis period (2012-2017).the general economic conditions across the world are more or less stable except for some of the major government changes. Overall, the granger causality test result indicates that developed markets do not have an effect on Indian market .whereas the economy with comparable demography (china) causes the Indian market. In other words, SHANGHAI composite index and NIFTY 50 indexes show signs of causal dependence during the time period of the study. Interestingly FTSE 100 is granger caused by NIFTY 50 (f statistic is 2.36: probability=0.9). This reflects the emerging importance of Indian economy both at regional and global level. If we go greater depths, several macro-economic factors might explain the causal relationships between any two stock markets. They include economic connection, foreign trade policy, regulatory mechanisms etc.

VII. Conclusion

Although the co-movements of national stock markets in different regions of the world have been studied extensively with different tools, the co-movements of the NIFTY, FTSE 100, S&P 500, SHANGHAI COMPOSITE and NIKKEI have not received copious attention. In this paper we have studied the magnitude of price dependency between selected stock markets by using daily closing data from 1st April 2012 to 31st march 2017.From the Results obtained from ADF test (table-1) it is observed that ADF level test does not have stationarity which means the null hypothesis is accepted. However in ADF 1st difference test proves stationarity in the data.Moving forward to the results obtained from next test johansen co-integration test (table-2) it is observed that at 0 hypothesized co-integrated equations there exists no co-integration equations between the stock markets. However we find co-integrated equations to be one where EIGEN test statistic is lower when compared to critical value at 5%. In the test methodology granger causality it is seen that only SHANGHAI COMPOSITE INDEX has causality relation with NIFTY 50 where the probability is less than 10%. FTSE 100, S&P 500, NIKKEI does not possess any causality with NIFTY 50. Having considered the results we observe that developed nations are no longer in dominant position to influence the stock prices of NIFTY 50 as it was in late 1990's.

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