

Interrelation among Economic Growth, Stock Market and Investor Sentiment: An Empirical Study

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Abstract: The main purpose of this article is to find out interrelationship among economic growth, stock market returns and investor sentiment in Indian scenario. In this regard the monthly time series data has been undertaken from January 2014 to December 2019. The proxy representation of respective variable has been chosen from previous literature e.g. Index of Industrial Production(Iip), Nifty50 return and Implied Volatility Index (Vix) have been the proxy for economic growth, stock market returns and investor sentiment respectively. To explore the relationship among these variables different statistical analysis e.g. correlation test, bi-variate casualty test as well as co-integration test have been used. The results of this study shows that in short run economic growth has significant unidirectional causality towards investor sentiment. In long run the all three variables are strongly co-integrated.

Keywords: economic growth, investor sentiment, Index of Industrial Production(Iip), Implied Volatility Index(Vix), stock market.

1. Introduction

Since last few decades India's economy witnesses unparalleled growth due to opening up private sectors which fosters capital infusion and over all liquidity in log run. At present there are number of multinational firms which are enlisted in Indian stock market plays a critical role to attract foreign investment further. Although the relationship between economic development and stock market is one of the most debatable subjects among economists but it can be undoubtedly said that capital inflow through foreign institutional investment helps to grow the Indian stock market at many times from post nineties. In present era of globalization and technological advancement stock market becomes one of the top destinations to attract the investment. However, there are many instances it is found that there is presence of stock market anomaly which may not be explained in context of movement of business cycle. Behavioral economists suggest the irrational dynamics of stock market happens due to absence of proper arbitrage opportunity and the presence of noise traders. From previous literature, it is found that there are number of studies are conducted in global scenario but very few are conducted in Indian context. Our present

article is to find the long time debatable question among the inter dependency of economic growth, stock market and investor sentiment.

2. Literature Review

Caporale et. al., (2004) had studied on the long term relation between economic growth and stock market on seven countries. They have found that the stock market played a significant role for long term economic growth for the countries. They had used VAR model to explore the interaction. Mosoud (2013) had shown that stock market development is crucial for boosting the economic growth of the country. In long term stock market would attract capital flow and liquidity in the economy. Therefore, stock market may be a crucial indicator for economic development of the country. Chen et al. (2013) have argued that there is significant impact of global & local market sentiment across different industry sector portfolio of different countries under ASEAN. Arif & Lee (2014) have shown that in the period of upward trend of business cycle there is evidence of high sentiment prevails across stock market which stimulates low stock return for investors. Pradhan et. al. (2015) had employed panel VAR model to examine the relationship among macroeconomic indicators and stock index for G20 countries for 51 years of time series data. It was found that although the short run relationship varies among countries but there is strong co-movement of economic indicators and stock index in long run in case of G20 countries. Pan et. al., (2018) have shown there is strong relationship exists between economic growth and stock market in Chinese stock market. However, there was a presence of irrational sentiment which would effect the short term relationship and movement of stock price. Xiao (2018) has used quintile regression approach for exploring inter dependency of stock market and investor sentiment. It is found that stock return is predicable in case of lower quintiles using the help of investor sentiment. Du & Hu (2018) has found that the impact of investor sentiment on US equity market is more significant in absence of relevant macroeconomic news. Pradhan et al. (2019) have found there is strong causality exists among economic growth and stock market development among

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Asian countries. The development in the stock market has encouraged foreign direct investments which would be helpful to foster economic growth of countries. Guru & Yadav (2019) have concluded that the growth and opening up the banking sector encourages the growth of financial market in case emerging countries like Brazil, Russia, China, India, South Africa. They have argued that financial market and banking sector remain complimentary to each other in these economics. Zhang (2019) has shown there is a significant impact of economic uncertainty on investor sentiment in case of USA financial market. In this regard, Lan et. al., (2021) have found there is presence of overvalued stock price due to the effect of investor sentiment in case pre-announcement period in regard to Chinese stock market.

3. Objective

The main objective of this study is to find out interrelation among economic growth, stock market and investor sentiment. Since there are very few research studies have been conducted in emerging market economy like India. Therefore, the basic focus of this article is to explore the specific relationship in Indian context.

4. Data and Methodology

The monthly time series data related to stock market return and sentiment have been taken from National Stock Exchange website. For the data related to Index of industrial production (Iip) has been taken from Reserve Bank of India published database. The all their variables have been transformed into logarithmic monthly change. Next to find out the stability of each series Augmented Dickey Fuller test have been conducted. For exploring causality and long run relationship Granger causality test and Johansen co-integration tests have been used. To find out the dependency of these variables vector auto regression model has been applied.

5. Analysis and Results

At first we have checked the correlation among these three variables:

Table 1
Correlation analysis

Variables		Nifty	Vix	Iip
Nifty	Pearson Correlation	1	-.254*	-.054
	Sig. (2-tailed)		.032	.655
Vix	Pearson Correlation	-.254*	1	-.181
	Sig. (2-tailed)	.032		.128
Iip	Pearson Correlation	-.054	-.181	1
	Sig. (2-tailed)	.655	.128	

*. Correlation is significant at the 0.05 level (2-tailed).
Source: Authors' own Estimation

From the table 1, it is found that stock market has significant correlation with implied volatility index(Vix) i.e. investor sentiment. Next to check the unit root of each series at level, Augmented Dickey-Fuller test have been applied with assuming only intercept and no trend in the equation. It is found

from table 2, table 3 and table 4 the series has a unit root at level.

Table 2
Unit root test for nifty

Null Hypothesis: Nifty has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=11)		
Augmented Dickey-Fuller test statistic	t-Statistic	Prob.*
	-6.914651	0.0000
Test critical values:	1% level	-3.525618
	5% level	-2.902953
	10% level	-2.588902
*MacKinnon (1996) one-sided p-values.		

Source: Authors' own Estimation

Table 3
Unit root test for Vix

Null Hypothesis: Vix has a unit root		
Exogenous: Constant		
Lag Length: 1 (Automatic - based on SIC, maxlag=11)		
Augmented Dickey-Fuller test statistic	t-Statistic	Prob.*
	-8.601406	0.0000
Test critical values:	1% level	-3.527045
	5% level	-2.903566
	10% level	-2.589227
*MacKinnon (1996) one-sided p-values.		

Source: Authors' own Estimation

Table 4
Unit root test for Iip

Null Hypothesis: Iip has a unit root		
Exogenous: Constant		
Lag Length: 10 (Automatic - based on SIC, maxlag=11)		
Augmented Dickey-Fuller test statistic	t-Statistic	Prob.*
	-6.914135	0.0000
Test critical values:	1% level	-3.542097
	5% level	-2.910019
	10% level	-2.592645
*MacKinnon (1996) one-sided p-values.		

Source: Authors' own Estimation

Next for conducting causality and co-integration test, we applied unrestricted vector auto regression model to find out optimum number of lags for these tests. For selecting optimum number of lags in VAR model, we have used AIC criterion and tested up to four lags. It is found that the optimum lag order is 2, in this case because AIC value is minimum in this case.

Table 5
VAR lag order selection criteria

VAR Lag Order Selection Criteria	
Endogenous variables: NIFTY VIX IIP	
Exogenous variables: C	
Lag	AIC
0	-8.066921
1	-8.551715
2	-8.748262*
3	-8.61331
4	-8.616376
AIC: Akaike information criterion	

Source: Authors' own estimation

After finding optimum number of lags in VAR model, Granger causality test and Johansen co-integration tests have been conducted to explore the short-term and long-term relationship among variables.

Table 6
Granger causality test

Pairwise Granger Causality Tests		
Lags: 2		
Null Hypothesis:	F-Statistic	Prob.
VIX does not Granger Cause NIFTY	0.93256	0.398
NIFTY does not Granger Cause VIX	2.52494	0.087
IIP does not Granger Cause NIFTY	0.11997	0.887
NIFTY does not Granger Cause IIP	2.05831	0.135
IIP does not Granger Cause VIX	3.65528	0.031*
VIX does not Granger Cause IIP	1.17801	0.314

Source: Authors' own Estimation

Table 7
Johansen Co-Integration Test
Table 7A

Trace Statistics

Trend assumption: Linear deterministic trend				
Series: NIFTY VIX IIP				
Lags interval (in first differences): 1 to 2				
Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.41067	74.3154	29.7970	0.000
At most 1 *	0.25555	37.8302	15.4947	0.000
At most 2 *	0.22364	17.4670	3.84146	0.000
Trace test indicates 3 co-integrating eqn.(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors' own Estimation

Table 7B
Maximum Eigenvalue Statistics

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen Value	Statistic	Critical Value	Prob.**
None *	0.41067	36.4851	21.1316	0.000
At most 1 *	0.25555	20.3632	14.2646	0.004
At most 2 *	0.22364	17.4670	3.84146	0.000
Max-eigenvalue test indicates 3 co-integrating eqn.(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors' own Estimation

From the causality and co-integration test, it is found that in short run economic growth has significant causality on investor sentiment at 5% level of significance. In long run it is evident that all these variables are co-integrated since null hypothesis is rejected at 5% level in case of both Trace and Maximum Eigen value statistics.

6. Findings

From the statistical analysis, it is evident investor sentiment has negative correlation with stock return whereas economic

growth has significant causality on investor sentiment. In long run all these variables are interrelated with one another.

7. Conclusion

The basic goal of this study is to explore interrelation among stock market, economic growth and investor sentiment. We have not found significant bidirectional casualty among these variables in all cases. However, it is evident economic growth impacts the investor sentiment which would further stimulate the dynamics of stock market. In long run these three variables are strongly interacted. This study would be helpful for policy makers and central bank to formulate the policies which may stimulate economic growth and financial market development in Indian context. Future researchers can carry out another study by undertaking emerging economics along with India to explore the interaction further.

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