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Impact of Consumer Sentiment Index on Equity Market Index: A Study on Indian Stock Market

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ABSTRACT

This research aimed at studying the impact of consumer sentiment Index on NSE Nifty volatility. In order to establish a possible long term and short term relationship we conducted Johansen co-integration test followed by VEC model. The result established that there is long term and short term relationship between NIFTY and Consumer Sentiment Index. The positive result of the Indian context through a light on the ongoing debate where the relationship is not universally accepted in the European and US markets.

JEL Classification: E22, E43, C22.

Keywords: VEC, Consumer Sentiment Index, Volatility, NIFTY.

1. INTRODUCTION

Indian stock market is believed to be highly volatile to economic and business events. Consumer Sentiment Index considered as proxy for the investor sentiment. Numerous studies were conducted in the past linking Consumer Sentiment Index and Stock market volatility with mixed results, however there is no single study validated on the Indian context. This study employed Econometric approach using Johansen Co-integration and VEC model to ascertain the relationship between Consumer Sentiment Index. The result indicates that Indian stock market is quick to react to Consumer Sentiment Index in short term as well as have strong long term relationships.

2. LITERATURE REVIEW

Generally economists believe that Consumer Sentiment Index can influence in the positive direction. And others feel that Consumer can't spend based on the sentiment. The consumers' Confidence Indexes are developed to measure the consumer expectations about future economic state.

In the past Consumer Sentiment index is linked with macro economic variables, house hold expenditure (Bram, J., & Ludvigson, S. C., 1998; Carroll, C. D., Fuhrer, J. C., & Wilcox, D. W., 1994; Wilcox, J., 2007; Nahuis, 2000; Romer, 1990; Acemoglu and Scott, 1994) Stock Prices (Morck, Shleifer, and Vishny, 1990; Porter & Samwick 1995; Maria Ward 2000; 1999; DeLong et. al., 1990; Ferrer, E., Salaber, J., & Zalewska, A. (2016)). Stock Market returns (Jansen, W. J., & Nahuis, N. J., 2003; Chen, S. S., 2011; Sum, V., 2014). Others debated to have used proxy for investor sentiments (Akhtar et. al., 2011, 2012; Coakley et. al., 2013; Qiu et. al., 2006; Kalotay et. al., 2007; Zouaoui et. al., 2011; Bathia et. al., 2013). In a recent study of Ferrer, E., Salaber, J., & Zalewska, A. (2016) has contradicted the past studies that CCI-Stock market relationship was not universally positive but a weak relationship exists between consumer expectations about future household finances and equity market volatility. Throop (1992) has found evidence only for consumer durable but unable to find evidence for non durables, the results suggest that there is varying degree of association with Consumer Sentiment Index. The changes in Economic environmental factors such as consumption (Poterba, 2000), investment (Tobin, 1969), balance sheet (Bernanke et. al., 1999) and the global market volatility (Nandini et. al., 2012) can influence stock market fluctuations. The past study and some of the contradicting results motivated as to study in Indian context as there is no study conducted in the Indian context.

3. DATA AND METHODOLOGY

The objective of the paper is to investigate the any possible co-integration and casualty between Consumer Sentiment Index and Market indices. The data for the Consumer Sentiment Index (CSI) is constructed by collaboration between Bombay Stock Exchange (BSE), Center for Monitoring Indian Economy (CMIE) and Survey Research Center, University of Michigan. The data has been released on Daily basis. We sourced daily index level data from National Stock Exchange (NSE). The data was extracted for the period of March 1st 2016 to January 2nd 2017. The trading days are matched with Consumer Sentiment Index data as CSI is also released on weekly holidays. The model is defined as follows:

$$\text{NIFTY}_t = \beta_0 + \beta_1 \text{CSI}_t + \mu_t$$

where, NIFTY_t is the NSE Nifty market index and CSI_t is a Consumer Sentiment Index, μ_t is the residual term.

If both CSI and market index is stationary at level I(1), we can't employ Ordinary Least Square (OLS), otherwise we need to employ other economic methods to test the relationships. Since the series is not stationary at level we proceeded further to test the level of integration and found time series CSI_t and NIFTY_t are stationary at I(1) using ADF and PP (Phillips & Perron, 1988) test.

4. JOHANSEN MAXIMUM LIKELIHOOD PROCEDURE

Since the given sample size is too large we can comfortably proceed further to test the co-integration using Johansen co-integration test (Johansen, 1991 & 1995) for long term relationship. The procedure involves

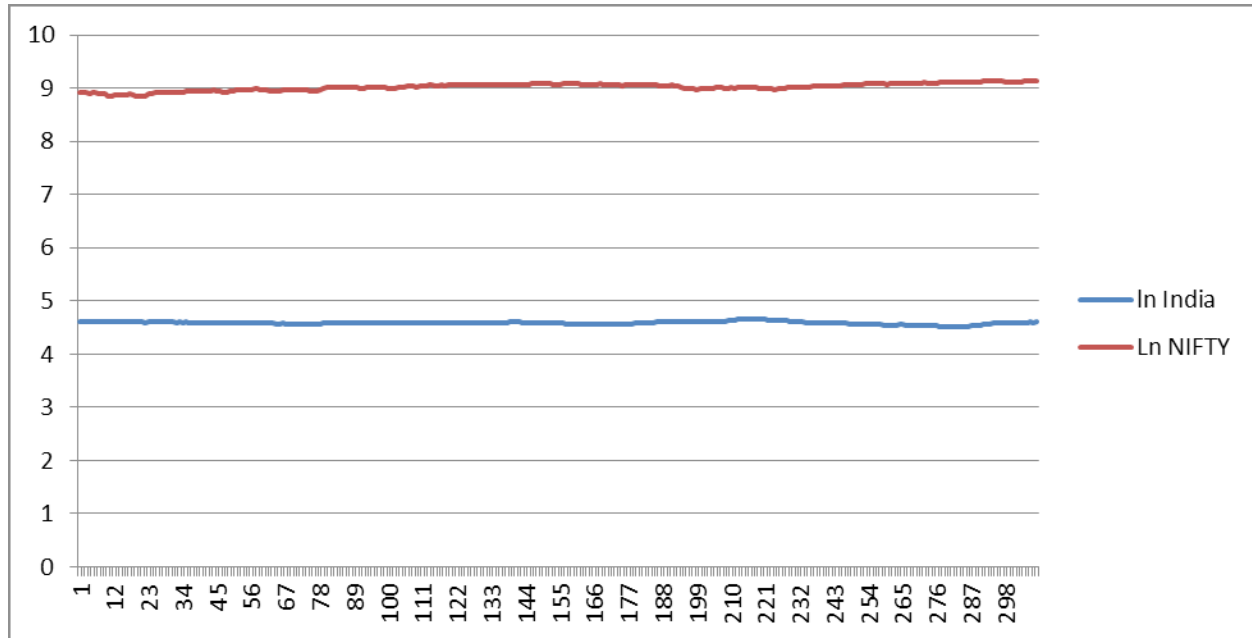


Figure 1: Consumer Sentiment Index vs NIFTY

a test for an order of integration of natural logarithm of the variable and subsequently investigating the co-integration using the VAR approach of Johansen. The co-integration rank, r is tested using two test statistics as follows. (1) Maximum Eigen value statistic (2) the trace statistic. If the T statistic for both co-integration rank is higher than the Critical values the null hypothesis of no co-integration is rejected. The procedure by specifying the optimum lag (p) of the multivariate VAR was set as 4 based on AIC criteria before conducting the co-integration test.

**Table 1
Descriptive Statics**

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>	<i>Skeweness</i>	<i>Kurtosis</i>
lnIndia	4.586422	0.027231	4.520701	4.659943	-0.0501893	3.72809
lnPrice	9.024746	0.06782	8.849457	9.14333	-0.5439748	2.68821

5. EMPIRICAL ANALYSIS

We first investigated the order of Integration which is a prerequisite for Johansen–Juselius Procedure. The result of ADF and PP test for Unit Root proved that the both NIFTY_t and CSI_t are I (1) in nature. The Table 3 depicts the results ADF and PP statistics of the series at levels and first differences. In ADF and PP tests where null hypothesis is the series is unit root and Alternative hypothesis is that the series is stationary. Since the series are I(1) in nature we proceeded further to conduct Johansen–Juselius Procedure to test the order of co-Integration.

The optimum lag order selection was based on the Schwarz–Bayessian information criteria and Akaike Information Criterion, HQIC, FPE and LR (Pesaran et. al.,2001). The lag selection criteria table is depicted in the Table 3 below.

Table 2
The results of Unit Root test

<i>Variable</i>	<i>ADF</i>	<i>PP</i>
<i>CSI (Level)</i>		
Level	-2.482	-1.785
Trend	-2.466	-1.627
No Level no Trend	-0.016	-0.165
<i>CSI (First Difference)</i>		
Level	-5.618	-14.877
Trend	-5.665	-14.895
No Level no Trend	-3.305	-10.796
<i>NIFTY Index (Level)</i>		
Level	-1.028	-1.931
Trend	-2.012	-0.952
No Level no Trend	1.272	1.327
<i>NIFTY Index (First Difference)</i>		
Level	-13.466	-18.787
Trend	-13.454	-18.763
No Level no Trend	-6.177	-9.897

Table 3
Lag Selection Criteria

<i>Lag</i>	<i>LL</i>	<i>LR</i>	<i>df</i>	<i>p</i>	<i>FPE</i>	<i>AIC</i>	<i>HQIC</i>	<i>SBIC</i>
0	1089.16				2.70E-06	-7.15238	-7.1426	-7.12793
1	2301.33	2424.3	4	0	9.50E-10	-15.1008	-15.0715	-15.0275
2	2313.21	23.762	4	0	9.00E-10	-15.1527	-15.1038	-15.0304*
3	2324.43	22.451	4	0	8.60E-10	-15.2002	-15.1317	-15.029
4	2331.93	14.993*	4	0.005	8.4e-10*	-15.2232*	-15.1352*	-15.0031

Since the series had auto correlation issue we used first difference of the dependent variable NIFTYt to test the co-integration. The co-integration test indicated that both series are co-integrated. As per the maximum eigen value test the null hypothesis $r_0 = 0$ of no co-integration was rejected at 5% level significance. The result of the trace test computed under the null hypothesis that $r = 0$ is rejected against $r \geq 1$ at 5% level significance. Significance at Maximum Eigen value test and Trace test for with and without trend are confirmed that there is a co-integration between CSI_t and $NIFTY_t$ at $r = 1$ at trend. We confirmed a longer term relationship exists between CSI_t and $NIFTY_t$.

The results proved that there is a longer run equilibrium relationship between Consumer Sentiment Index and NIFTY. The results are depicted in the Tables 4 & 5. Once a co-integrating relationship is established among variables, we proceeded to test the Vector Error Correction Model. The result of the model also establishes a short run relationship among the variables of our interest. The results of VECM NIFTY is quickly adjust with Consumer sentiment Index (CSI) with Coefficients of (-1.15714), further CSI is significantly related to NIFTY at L3D. This result confirms that there is a long run equilibrium relationship exists between NIFT and Consumer Sentiment. The results of the VECM estimates are depicted in the Table 6.

Table 4
Johansen Co-integration test without Trend

Maximum Rank	Parms	LL	Eigen Value	Trace Statistic	5% Critical Value
0	16	280.7611	.	85.4429	18.17
1	19	321.3584	0.23507	4.2482	3.74
2	20	323.4825	0.01392		

Maximum Rank	Parms	LL	Eigen Value	Max Statistic	5% Critical Value
0	16	280.7611	.	81.1947	16.87
1	19	321.3584	0.23507	4.2482	3.74
2	20	323.4825	0.01392		

Table 5
Johansen co-integration test with Trend

Maximum Rank	Parms	LL	Eigen Value	Trace Statistic	5% Critical Value
0	14	280.74311	.	82.7228	15.41
1	17	321.34092	0.23507	1.5272*	3.76
2	18	322.10452	0.00503		

Maximum Rank	Parms	LL	Eigen Value	Max Statistic	5% Critical Value
0	14	280.74311	.	81.1956	14.07
1	17	321.34092	0.23507	1.5272	3.76
2	18	322.10452	0.00503		

Table 6
VECM Estimates

	Coef.	Std. Err.	$\hat{\alpha}$	$P > \hat{\alpha} $	[95% Conf.
<i>D_LnPriceF</i>					
<i>_ce1</i>					
L1.	-1.15714	0.127852	-9.05	0	-1.407722 -0.90655
<i>LnPriceF</i>					
LD.	0.05752	0.108176	0.53	0.595	-0.1545018 0.269541
L2D.	-0.00103	0.085363	-0.01	0.99	-0.1683346 0.166282
L3D.	-0.02822	0.057548	-0.49	0.624	-0.1410156 0.08457
<i>lnIndia</i>					
LD.	-93.4855	49.63556	-1.88	0.06	-190.7694 3.79839
L2D.	51.87129	49.44665	1.05	0.294	-45.04236 148.7849
L3D.	113.0078	49.95337	2.26	0.024	15.10095 210.9146
_cons	-3.51E-11	0.167539	0	1	-0.3283704 0.32837
<i>D_lnIndia</i>					
<i>_ce1</i>					
L1.	0.000206	0.000147	1.4	0.161	-0.0000823 0.000495

	Coef.	Std. Err.	z	P > z	[95% Conf.]	
<i>LnPriceF</i>						
LD.	-0.00019	0.000125	-1.54	0.124	-0.0004355	5.27E-05
L2D.	-7E-05	9.83E-05	-0.71	0.479	-0.0002622	0.000123
L3D.	-6.76E-06	6.63E-05	-0.1	0.919	-0.0001366	0.000123
<i>lnIndia</i>						
LD.	0.159554	0.057145	2.79	0.005	0.0475518	0.271557
L2D.	0.213629	0.056928	3.75	0	0.1020532	0.325206
L3D.	0.159367	0.057511	2.77	0.006	0.0466472	0.272086
_cons	-3.08E-07	0.000193	0	0.999	-0.0003784	0.000378

Post estimation test also confirmed the short run relationship $\chi^2(3) = 8.58$ and $\text{Prob} > \chi^2 = 0.0354$. The result of LM test is depicted in the table. So we accept the alternative hypothesis of no auto correlation. The result of the LM test assures there is no auto correlation. The Result of LM test depicted in the Table 7.

Table 7
LM Test

lag	chi2	df	Prob > chi2
1	1.669	4	0.79635
2	5.5251	4	0.23753
3	2.4649	4	0.65094
4	2.7427	4	0.60176

6. CONCLUSION

The result of the study indicates there robust long term and short term exists between the CSI and NIFTY in India at a lag of L3D. It also validates the past studies; however depart from the recent finding of Ferrer et. al., (2016) where CCI and stock market is not universally positive. The short run relationship which adjusts quickly to achieve equilibrium indicates that Indian investors react quickly to consumer sentiments. The relationship is co-integrated at a long run suggest, the sentiment is carry forwarded over the period and it is in the memory of the investors. This indicates that Indian investors are very cautious about which support the nature of the Indian equity markets. This study also support past argument on CSI as proxy variable for Investor Sentiment.

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