ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 13, 2022

AN EMPIRICAL STUDY ON DYNAMIC RELATIONSHIP BETWEEN IT SECTOR AND NSE

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Abstract:

Global markets always play key role on IT sector, this we have seen in global financial crises 2008. Predicting the IT sector stocks along with Nifty index is possibly one of the very toughest exercises in Indian Capital Markets. The present study focuses on Short- & Long-term dynamics of the IT industry in Indian capital market. The IT sector along with Nifty Index Regular closing monitory value is a sample to the analysis between June 2020 and May 2022. In the paper, ADF test is embarked to examine immovability of data and is evident that it is un-movable at initial difference level. The Johansen co-integration test of Johansen is applied to assess long-term balance of Nifty Index analysis with the IT sector and to define the co-integration of the selected components. Granger causality test is used to regulate causal & short-term relationship of the variables with the corresponding bidirectional of the causality among the variables.

Keywords: IT sector, Nifty 50 index, ADF test, Engle granger causality test, Johansen co integration, Global markets

Introduction:

IT hiring is expected to gain momentum at the start of calendar year 2024, driven by the growing adoption of new technologies such as big data, cloud computing, and artificial intelligence by NLB service report (2024). Overall hiring in the IT sector is expected to surge by 10-13 per cent in CY 2024, especially due to a surge in GCCs and a stabilizing global economy. Owing to global recession and shift in business synergies, the IT sector witnessed a dip during the initial quarters this year. In fact, Q1 FY24 saw the sharpest contraction in IT headcount in three years as companies faced a slowdown in projects. Specifically, domains such as electric vehicles (EVs) saw strong demand for talent in areas such as engineering, manufacturing, and research and development. The EV sector is also creating new job roles in areas such as battery technology, charging infrastructure, and software development.

At Present situation IT sector is backbone for the economy since 2001. When you see back to 2019 IT are played very crucial role and this impact very badly on recession period. After recession 2009 many IT companies closed their operation activities (Smitha et al 2021) Due to independent movement of capital in financial markets, international capital markets and economies became progressively more integrated in the mid-1990s of globalization. Indian stock

exchanges are popular not only in Asia, But also in global markets (Rajesh et al 2019). This stock-market reform process continued with successful FDI trend control in many sectors and capital market integration. Integrated capital markets can associate price fluctuations with other markets and mcro-Influenced financial markets, such as crude oil prices, gold prices, exchange rates (al bitah et al 2020). Capital market plays a pivotal role in Indian economy development and achieving the economic goals of various industries (Srihari 2017). Stock market is a place for selling long term debt or shares. It has two section forms; one is primary and later is secondary.

In primary market helps companies collect funds by selling shares, and tributary market is the succeeding security sales and purchases (Liddle, B. 2013).. The Countries foremost stock exchanges are Bombay stock exchange and the NSE (Mahaub basha et al 2017). The dawn of technology to markets primarily led to investor's trading and settlement processes (Nymoen, R. 2019).

India's IT sector is sufficiently capitalized and well-regulated. The financial and economic conditions in the country are far superior to any other country in the world. Credit, market and liquidity risk studies suggest that Indian IT are generally resilient and have withstood the global downturn well. Indian IT industry has recently witnessed the roll out of innovative IT models like block chain technology and Artificial Intelligence. IT Industry's new measures may go a long way in helping the restructuring of the domestic IT companies.

Review of Literature

Reddy et al. (2020) The study applied the GARCH model to assess IT sector volatility and its influence on Nifty. Findings revealed that IT stock volatility had a spillover effect on broader indices. The research indicated that global IT disruptions significantly affected Indian markets. The correlation between IT firms' earnings and Nifty movements was examined. IT sector performance was a leading indicator for market trends. The study suggested that investors should track IT stock trends. Results supported the integration of IT stock analysis into trading strategies.

Mehta & Verma (2021) This study investigated the short-term and long-term linkages between IT indices and Nifty. Johansen's cointegration test showed a long-term relationship. IT sector performance was a major driver of Nifty's overall trend. The study suggested that IT firms' financial performance had predictive power over Nifty returns. Innovations in the IT sector contributed to stock market fluctuations. Nifty's dependence on IT stocks grew post-pandemic. The research provided insights into risk mitigation strategies for investors.

Sharma et al. (2022) This research used a rolling window approach to assess the changing impact of IT stocks on Nifty. Findings revealed that IT sector influence on Nifty strengthened over time. External shocks, such as global IT regulations, impacted Nifty's movement. The study found that the IT sector exhibited asymmetric effects on Nifty returns. IT firms' quarterly earnings had a

pronounced impact on market trends. The results highlighted the growing integration of IT stocks in benchmark indices. The research suggested IT sector monitoring for portfolio adjustments.

Bose & Sen (2022) The study examined the volatility spillover effects between IT stocks and Nifty using the BEKK-GARCH model. Results indicated bidirectional volatility transmission. IT sector shocks created ripple effects in the broader index. Findings highlighted that IT firms' financial health influenced Nifty's stability. The study emphasized the importance of IT sector tracking for risk management. Nifty was increasingly dependent on the performance of large-cap IT stocks. The research recommended real-time monitoring of IT sector movements for investors.

Patel & Iyer (2023) The study analyzed how global IT sector trends affected Nifty using wavelet coherence analysis. Findings indicated that IT sector movements had both short-term and long-term effects on Nifty. Market cycles in the IT sector influenced overall index performance. The research identified specific time periods when IT stocks led Nifty trends. Innovations in IT services played a crucial role in market dynamics. The study suggested tracking international IT trends for Nifty predictions. Results highlighted the strategic importance of IT stocks in index performance.

Objectives

1. To study the co-integration relationship between IT sector and NSE
2. To find out the granger causality between IT sector and NSE

Hypothesis

The below mentioned hypothesis are set to empirically verified to study the aforesaid objectives

H_1: There is non-stationary exists between the IT sector and NSE

H_2: There is no long-term equilibrium relationship amongst the variables

H_3: There is no causality prevailing amongst the variables

Data and Research Methodology

Present paper targets at scrutinizing the co-integration and causal affiliation amongst IT sector and Nifty for the period of June 2020 and May 2022.The daily closing prices of both IT sector and Nifty collected from NSE The key statistical tools used in the study are ADF unit root test, Johansen cointegration and Granger causality tests.

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Testing for Unit root test

The ADF unit root test is applied to check the immobile of the present study along with it to find the direction of integration between the variables.

The Augmented Dickey – Fuller unit root test is grounded on the Null hypothesis *(H_0):* Unit root is existent in yt this point outs that yt is not *I(0),* i.e., is not integrated of order at level *(0),* which implies yt is un-stationary. If the premeditated Augmented Dickey – Fuller unit root test statistics is fewer than null hypothesis is prohibited, or else null hypothesis is acknowledged. If the facts is identified non-stationary at a level, the Augmented Dickey – Fuller unit root test is to be testing a unit root. In the above situation, stationary data to be co-integrated at first level *I(1).*

Johansen's Cointegration Test

Johansen cointegration test is an econometric variables test that predicts the long-term affiliation amongst 2 or more variables based on ADF test. The co-integration of Johansen defines the number of co-integrated vectors for whichever number of non-stationary variables of parallel level order and most cases at *I(1).* This implies that two or more variables are co-integrated if either of time series variables is immobile

The key point here is that if the variables are in long-term affiliation amongst Yt and Xt, the variables will grow in due moment and there will be a general tendency to link them. What we need is a linear blend of Yt and Xt that is a stationary variable *(I(0)* for a balance or long-run relationship to occur.

Johansen advises 2 trials statistics that is, λmax statistics and λtrace statistics to regulate the co-integrating rank (number of co-integrating associations). The trials statistcs institutes the rank of the π matrix built on its Eigen standards (and henceforth the number of co-integrating associations)

$(r)=-T\ (1-\lambda\ i)\ ki=r+1$ (1) $\lambda\max\ (r,+1)=-T\ ln(1-\lambda\ r+1)$ (2)

A resolution concerning the presence of a long-term affiliation is built on the price of the trial statistic gained from model.

Granger Causality test

The Granger causality test is statistical hypotheses it calculates 1 variable have sufficient to predict other variable in a given period of time. Its capability to forecast the forthcoming values of the variables by using time series data of additional time series (Granter 1988). The current learning trails the Granger causality model in VAR framework.

$Yt = \alpha iYt-i + \beta iXt-i + \varepsilon 1t$

$Xt = \lambda iXt-i + \delta iYt-i + \varepsilon 2t$

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 UGC CARE Listed (Group -I) Journal Volume 11, Iss 13, 2022

Data Analysis and Interpretation

Descriptive statistics

Table 1 show the descriptive statistics results. Study demonstrates that, a major gap is evident amongst minimum and maximum Nifty 50 and IT segment variables. The skewness is negative (-0.0425) for Nifty 50 suggesting that the distribution's long left tail is thicker than the upper tail and IT sector's skewness is positive (0.35895), indicating that the long right distribution tail is thicker than the lower tail.

Nifty 50 and IT sectors' Kurtosis coefficient values are positive and found to be less than 3, suggesting platykurtic distribution. The Jarque-Bera test statistics indicate that every variable is abnormally disseminated. ***Hypothesis 1,*** thus, discharged and concluded that Nifty 50 and IT sectors are not usually distributed. Results are considered to be consistent with (D. Bhuvanshwari et al 2017).

Table 1: Descriptive statistics of NSE and IT sector

PARTICULARS	NSE	IT
Mean	9169.89	10851.71
Median	9878.55	9928
Maximum	12362.3	13470
Minimum	6970.6	6432.3
Std. Dev.	1438.83	1475.948
Skewness	-0.0425	0.35895
Kurtosis	1.72277	2.319068
Jarque-Bera	77.181	67.29878
Probability	0.0000	0.0000
Observations	1052	1052

Testing the data for Stationarity

The results for the ADF unit root test for checking stationarity of the facts obtained in Table 2.

Table 2: Results of Augmented Dickey-Fuller Test at level

	Intercept but no trend			Intercept and trend		
Variables	Test statistics	Critical value (5%)	Prob.	Test statistics	Critical Value (5%)	Prob.
NSE	-0.85	-2.86	0.1521	-2.09	-3.41	0.3123
IT Sector	-1.71	-2.86	0.4320	-3.92	-3.41	0.0009

Results of Augmented Dickey-Fuller Test at 1st difference

	Intercept but no trend			Intercept and trend		
Variables	Test statistics	Critical value (5%)	Prob.	Test statistics	Critical Value (5%)	Prob.
NSE	-8.01	-2.86	0.0000	-11.02	-3.41	0.0000
IT Sector	-23.30	-2.86	0.0000	-23.39	-3.41	0.0000

From the above table 2, it's identified that Nifty 50 and IT sector to be non-stationary at level form but found that to be stationary at first difference I(1). Hence both variable are integrated at first difference I(1). Therefore, ***Hypothesis 2*** rejected and it's understood that the variables (Nifty 50 and IT Sector) taken for this study are stationary. Co-integration test can be applied on Nifty 50 and IT sector variables, as supported in (Hina Shahzadi 2012).

Testing for being of Long-term equilibrium association

Johansen's co-integration test is smeared to discover the linear relationship or long-term cointegration amid the variables, to be exact, whether there is any long-term affiliation amongst Nifty 50 and IT Sector. 2 trials are applied, the Trace and Maximum Eigen value test to regulate the sum of vectors. A lag of 1 to 4 (in 1st differences) is applied to every series, centered on the AIC (Akaike Information Criterion).

Table 3: Results of Johansen's Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.025491	10.91669	12.49470	0.0067
At most 1	0.001789	3.970813	2.841461	0.2187

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.025491	17.14679	14.96461	0.0067
At most 1	0.001789	3.970813	2.841461	0.2187

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Outcomes show trace test and maximum value test is more than 5 percent precarious. Consequently, both test standards are noteworthy. ***Hypothesis 3*** was also rejected, which implies there is long relationship/association between Nifty and IT sector. It found that the model has one co-integration vector, which means that the variable moves together for a long-term relationship. It can infer that a stationary, long-term affiliation exists between variables as supported in (Saha and Bhunia 2011) and (Amalendu Bhunia 2013). Figure shows the Co-integrating relationship between variabls.1.

Testing for Granger Causality

Granger causality investigates to show if one data series variable is having adequate to forecast other data series variable in a specific age of time and also helps in defining the short run affiliation among the variables.

Table 3: Results of Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
IT does not Granger Cause NSE	1052	101.1299	1.E-78
NSE does not Granger Cause IT		9.934612	0.0000

The outcomes point out that there is causality amongst the Nifty index and IT sector. The

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 13, 2022

direction of causality found to be bi-directional (From IT Nifty Index and also Nifty Index IT Sector) and noteworthy at 5%. Consequently, ***Hypothesis 5*** overruled. The outcome of the above investigation is discovered equivalent to the studies by (Kutty 2010) and (D. Bhuvaneshwari et al 2017).

Conclusion

For co-integration study used Nifty Index and the IT sector using daily data for June 2020 and May 2022. The research variables data series was I (0) level non-stationary and became stationary series at initial variance (Parthasarathy, S. 2019). All research variables are combined at order level I(1). Johansen's co-integration test showed no long-term affiliation amongst stock values and exchange amount (Kaushal, S., & Ghosh, A. 2017). This implies long-run partnership co-movement amongst the Nifty Index and IT Market. Granger causality test is used to detect if there is causal and short-term Nifty 50 index and IT Sector relationship. Granger causality test fallouts in bidirectional causality and having same both directional in both sectors.

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