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Domestic Institutional Investors and Sectoral Indices of India: A Toda Yamamoto Approach

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ABSTRACT

The study investigates the behavioral dependence of domestic institutional investors (DIIs) on the sectoral indices of the national stock exchange of India. For the first time in the Indian context, domestic institutional investors are studied in a broad sense, i.e. the study does not include merely mutual funds, but financial institutions, insurance companies, and venture capital funds also. The results reveal positive and strong behavioral dependence of many sectoral indices in the national stock exchange on financial institutions, insurance companies, and mutual funds. The Correlation results support the results of the Toda Yamamoto model by showing strong and positive correlations of sectoral indices vis á vis financial institutions, insurance companies, and mutual funds. The results of the Toda Yamamoto model for venture capital funds, on the other hand, are insignificant with a weak correlation. In contrast to the findings of many previous studies that mutual funds do not affect future stock returns the current study reports that causality runs from financial institutions, insurance companies, and mutual fund investments to sectoral indices of the national stock exchange of India. These results illuminate the important role played by domestic institutional investors in Indian stock markets.

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1. Introduction

The growth of the capital market of a country always requires a flow of investment to serve the requirement of investment projects, and the move of domestic institutional investors (DII) can be regarded as noteworthy in this direction. The financial markets are one of the parameters for the real economic development of a particular nation. As per financial economists, two principal channels can lead to the improvement of the financial system of a country causing economic growth. Firstly, economic growth is done by capital accumulation through foreign institutional investment (FII). For the mobilization of savings and channeling them for capital build-up, a systematic and structured financial system is required. This shows that a robust financial system can lead to economic growth. Secondly, an efficient financial system can provide credit and other financial facilities to industries. Thus, this exhibits the importance of financial markets fueling the economic growth of a nation.

In this direction, institutional investors are crucial players in the growth of the financial markets. The organizations that pool a tremendous amount of money in shares and many other types of financial assets are called institutional investors. Mutual funds, Insurance companies, financial institutions, venture capital funds, hedge funds, and pension funds come in this category. These investors are different from each other as each is having a different risk-taking capacity, investment beliefs, tax issues, and governance structures. They deal with a large volume of data for investment in shares, and hence the influence created by them on the stock market is implied.

In comparison to individual investors, institutional investors are more influential as they have better resources to manage their investments. Mutual funds are trusts, which make a pool of funds from the saving done by various investors who have similar financial goals. Very qualified managers manage these funds, and these funds aim to create capital gains for the investors. The primary purpose of insurance companies is to provide insurance, but they provide a variety of other schemes which apart from insurance also promise for the growth of money invested in the scheme. Investments done by these insurance companies are usually stable and for the long term. Pension funds and insurance companies are major domestic institutional investors in many large developed economies like Canada, Netherlands, USA, and UK (OECD, 2013). As far as India is concerned, it is an emerging economy, and the role of pension funds as institutional investors is in a developing phase. Financial institutions comprise all public and private banks and non-banking financial institutions that invest in capital markets as they want to earn on the surplus money which they hold. Venture capital is an investment that is done into the equity share of a firm that has the potential to grow in the near future. Due to the growing international competition scale and number of business firms are increasing in India and thus the investment in venture capital funds also proliferating.

Regarding India, post-liberalization the capital markets have shown enormous growth, which leads to change in the economic conditions within the global sphere. The growth of Indian capital markets has attracted many foreign institutional investors as the investment made by them dictated the style of the markets. Apart from FII, DII also

influence the movements of the stock markets. Over the past years, the investments done by DII's have increased a lot into the Indian stock market. The investment done by DIIs in Indian stock markets increased to Rs 20.42 trillion in June 2019. From the year 2009 to 2019, the DII ownership in Indian equity markets has increased 2.12 percentage point to 13.78 percentage point, which means an increase of 11.66 percent (Coutinho, 2019).

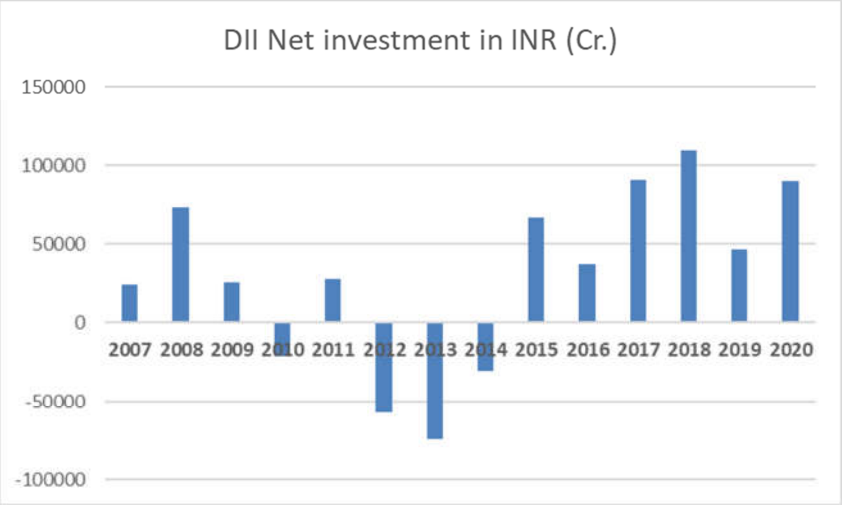

Figure 1. Growth Of DII in the Indian Capital Market Till
Source: Research findings.

As the participation of DIIs increases in the Capital market, they are not only going to affect the Nifty50 index of the National stock exchange of India (NSE) as a whole, but they can also impact the sectoral indices of NSE. The sectoral indices constitute the performance of the companies which represent the activity under one specific sector. Like Nifty Auto, an index is designed to represent the performance of the automobile sector (15 stocks). Nifty Bank reflects the behavior of large and liquid banks (12 stocks). Nifty FMCG reflects the behavior of FMCG companies (15 stocks). Likewise, other indexes are also made as nifty IT (20 stocks), nifty Media (15 stocks), nifty Pharma (10 stocks), nifty PSUbank (12 stocks), nifty Private bank (10 stocks), nifty reality (10 stocks). Not only this, three major indexes of NSE i.e. nifty 500[1], nifty200[2], and Nifty 100[3] are also included in the study.

Objectives of the Study

1) To find the behavioral dependence between the individual domestic institutional investor i.e. the Mutual Funds (MF), insurance companies (IN), Financial institutions (FI), and venture capital fund (VC) vis á vis the sectoral indices of the national stock exchange i.eNiftyAuto, NiftyBank, NiftyFMCG, NiftyIT, NiftyMedia, NiftyPharma, NiftyPrivatebank, NiftyReality, Nifty100, Nifty200, and Nifty500.
2) To find out how strong the relationship between the institutional investors and the sectoral indices of the national stock exchange is. The rest of the paper is arranged in the following manner next section contains the literature review,

Section 3 continues with the data and methodology explanation followed by Section 4 which holds the empirical results, and finally, Section 5 concludes the paper.

2. Literature Review

A study in Kenya (Nairobi stock exchange) conducted by Ndei et al. (2019) during a period of January 2010 to December 2017 reveals that Mutual funds sales granger causes stock market returns and vice versa. If stock market returns increase then mutual fund managers will buy more stocks and when mutual fund managers buy more stocks, the price of stocks increases more market-leading to the consequent increase in market returns. Cha (2018) analyses Korean markets and that mutual funds do not Granger cause stock market returns, but it is the stock market returns that cause mutual funds in the presence of market fundamentals. The study was covering a data set from Januarys 1995 to December 2016. A study on the Taiwan market with a sample from January 1999 to September 2006 (Chiang et al., 2012) discloses that when the stock price is near equilibrium, then DII purchases stock which positively impacts the stock markets of the Taiwan stock exchange. Baik et al. (2010) Conducted a study on the effect of trading activity done by local and non-local institutional investors on stock returns. The sample period of the study is from 1995 to 2007 which included all types of institutional investors like investment advisors, insurance companies, mutual funds, and banks. Both domestic and foreign institutional investors forecast future stock returns but the auguring power of domestic institutional investors is statistically more significant. Oh and Parwada (2007) studied the relationship between stock market returns and mutual funds in Korean markets. The research incorporated daily data from 1996 to 2003, which reveals that mutual fund purchases cause stock market returns and a positive relationship exists between the two. The data on net mutual funds reveals that it is the returns that cause the flow. Samarakoon (2009) divided the investors into foreign institutional investors, domestic institutional investors, domestic individual investors, and individual foreign investors in Sri Lankan markets and found the relationship with equity flows. Findings show that the purchase and sale of both the investors, either institutional or individual, had positive relationships with past returns; the exception was the crisis period where negative relation was coming. Domestic institutional investment and foreign institutional investment lead to higher future returns. Boyer and Zheng (2009) studied an extended period of data from 1952 to 2004 in which various investor types were covered to study the relationship with the stock returns, like insurance companies, mutual funds, pension funds, household, foreign investors, and closed-ended fund of U.S equity market. Correlation results and regression analysis results show that the contemporaneous relation between foreign investors and mutual funds with stock returns are favourable for the full sample. The paper reports weak evidence of the ability of investor types to augment for future stock returns. An error correction model applied on the data of Greece stock exchange for a period of July 1994 to December 2003 gives an indication of bidirectional causality between the stock returns and Mutual funds (Alexakis et al., 2005).

Talking about studies in Indian markets, Acharya (2011) took data from a period of January 2000 to December 2009 which he divided into three sub-periods (2000- 2003, 2004- 2007, and 2008- 2009) due to the possibility of changes in trends. He found substantial changes in the results of three sub-periods. In the first two sub period's bidirectional Granger causality was coming between mutual funds and stock returns. However, during the third part of the period, the causality running from stock returns to mutual funds was unidirectional. Naik and Padhi (2014) studied a data set of FII and Mutual funds from January 2002 to July 2012 under a VAR model. They found bidirectional Causality from BSE returns and institutional investments. They found that mutual funds (which represent DII) and FII are significantly influencing the BSE returns. On the contrary, Sehgal and Tripathi (2009) found that Mutual funds are not having any causality for stock returns, but it is the BSE Sensex returns that cause the inflow and outflow of mutual funds. A causal study of stock returns of BSE Sensex[4] and mutual funds in Indian markets shows that mutual fund sales are caused by the stock markets returns whereas the latter is not affected by the former (Thenmozhi and Kumar, 2009). A similar study of Indian stock markets by Bose (2012) where she has taken daily data from April 2008 to March 2012 found no causal relationship between mutual funds and BSE stock returns. Ghosh (2014) conducted a regression analysis to find out the relationship between FII and DII with BSE[5] 100 by taking data from around six years (SEPT-2007 to OCT-2013), and the results depicted that BSE100 returns showed dependence on the DII trading activity.

The variance decomposition analysis in a VAR scenario of stock returns and Domestic institutional investors of India shows that DII purchases define market returns, whereas market returns define DII sales. The data of DII contains combined data of mutual funds, banks, insurance companies, and financial institutions from the period of March 2007 to June 2016 as the separate data of individual DII was not available (Mishra and Debasish, 2017). Arora (2016) investigated the relationship between the equity flow of DII as well as FII and stock returns. A more comprehensive definition of the DII has been used in the study, which includes mutual funds, insurance companies, financial institutions, and banks but the individual data was not available so consolidated data was used. Under the VAR environment, correlation test, and Granger causality test, the study finds a significant positive relationship between stock market returns and DII. Natchimuthu and Prakasam (2018) find granger causality running from market returns to domestic institutional investors and not vice-versa this result is also supported by Chauhan and Chaklader (2020).

All studies have shown Granger causality with market returns which is having mixed results. None of the studies have taken into consideration the sectoral indices of the stock market which represent various Sectors of the economy as they contain stock of sector-specific industries of that sector.

This research differs from previous literature, first, it considers the causality relationship with Domestic individual investors which is not studied under a bifurcated lens. Only the consolidated data of DII is used for every study in the Indian context. Secondly, no study has found a relationship between DII with the sectoral indices.

Thirdly strength of the relationship between the DII and sectoral indices of the national stock exchange has not been studied with the new linear causality technique of the Toda Yama motto. Fourthly a unique data set of four types of institutional investors is taken for the study.

3. Data and Methodology

The study investigates the dynamics of the connection between sectorial stock market indices of the national stock exchange (NSE) and the DII trading in the NSE. The required data for the study i.e. the Domestic institutional investors flow in the national stock exchange is collected from the "nseinfobase". The DII flow consists of monthly data of financial institutions (FI), insurance companies (IN), Venture capital funds (VC), and Mutual funds (MF). The data for nifty Sectoral indices that represent the performance of the companies belonging to a particular sector is collected from the NSE website. The closing price of sectoral indices taken under consideration for the study are NSE100, NSE200, NSE500, NSEAuto, NSEBank, NSEFMCG, NSEIT, NSEMedia, NSEPharma, NSEPrivateBank, NSEreality, the data is collected from a period of March 2009 to April 2019 monthly. Log form of every variable is used in the study.

In opposition to most of the studies which apply the Granger (1988) linear causality test, this study has utilized the procedure for causality as given by Toda and Yamamoto (1995). This test is particularly very useful for the time series, which has a small sample size and is suitable for time series where the order of integration is not the same among the series. If the order of integration of any series is more than two, then also this test can be applied. One more advantage of using Toda and Yamamoto's (1995) testing process is that it does not require that one should know the order of integration of the variable until the order of integration exceeds the true LAG length of the model. This procedure directly performs the test on the coefficients of the levels of VAR, which helps in minimizing the risk of a wrong reorganization of integration order and the presence of a cointegration relationship (Giles, 1997).

The fundamental idea in this linear approach is augmenting artificially the right order of the VAR model, which is represented by k, and the maximum suitable integration order of the time series,d, which are the extra lags. So, in the beginning, it is needed to determine the maximum integration order of the series under study, say, d_{max}. After that optimum LAG length of the VAR model is required to be determined with the help of various information criteria given. There are several information criteria given to determine the appropriate LAG length for the VAR model for example Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Final Prediction Error (FPE), and Hannan-Quinn (HQ).In this paper, the AIC criterion is used for considering the LAG length as in a small sample this criterion is best suited. In the next step, the$(p=k+d_{max})^{th}$ order of VAR is to be calculated with the help of seemingly unrelated regression (SUR).

In the end, using Wald statistics, the null hypothesis of no causality needs to be tested. It is necessary to link two variables in a bivariate system while implementing Toda and Yamamoto approach to Granger causality, which is done s follows:

$$Y_t = A_0 + A_1 Y_{t-1} + \ldots\ldots + A_k Y_{t-k} \varepsilon_t \quad (1)$$

where, $Y_t = \begin{bmatrix} Y1t \\ Y2t \end{bmatrix} = \begin{bmatrix} Variable1 \\ Variable2 \end{bmatrix}$ and

$\varepsilon_t \sim i.i.dN(0, \mu); and A' s are\ 2X2\ matrix of coefficients$

The Augmented levels of VAR($p=k+d_{max}$) need to be estimated to test the null hypothesis of no causality.

$$Y_t = \alpha + A_1 Y_{t-1} + \ldots\ldots + A_k Y_{t-k} + A_{k+1} Y_{t-k-1} + \ldots\ldots + A_p Y_{t-p} + \varepsilon_t \quad (2)$$

SUR technique is utilized to estimate the augmented VAR system. The null hypothesis used in the study is:

H1: Y2t does not cause Y1t i.e $a_{12}^1 = a_{12}^2 = \ldots\ldots = a_{12}^p = 0$

H2: Y1t does not cause Y2t,i.e $a_{21}^1 = a_{21}^2 = \ldots\ldots = a_{21}^p = 0$

The above two hypotheses need to be tested with the help of the Wald test. The Wald statistics (W) holds an asymptotic $\chi 2$ distribution with k degrees of freedom. The remaining d_{max} autoregressive parameter is ignored in testing Granger causality because it aids to overcome the issue of non-standard asymptotic properties related to the standard Wald test for integrated variables.

3.1 Confirmatory Analysis

To start with the causality analysis, the first step is to find out the order of integration of the variables required for this analysis. The series taken understudy need to be tested for stationarity with the help of the unit root test. Augmented Dickey-Fuller (ADF) holds the null hypothesis that the series has a unit root and hence if the P-value comes significant the series is stationary. Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test is also used to test the order of integration of the series, which has a null hypothesis that the series is stationary. The KPSS test was developed by (Kwiatkowski et al., 1992), who proclaims that his test is meant to complement other tests meant for checking the order of integration. By doing both tests we can determine the series which seems to be stationary, the series which seems to have a unit root, and the series for which the data or the test are not sure whether it is stationary or have a unit root. This will help in taking correct inferences about the time series data and is known as "confirmatory analysis". If the null of the ADF test is rejected (accepted) and if the null of the KPSS test is accepted (rejected), then it means that the series is stationary (non-stationary). If both the null hypothesis is accepted (rejected), then we cannot confirm the results.

3.2 Correlation Analysis

The use of Correlation analysis is done in the study to know the contemporaneous relation between the mutual funds, insurance companies, financial institutions, and venture capital funds Vis á Vis the sectoral indices of the national stock exchange.

4. Empirical Findings

The rationale for operating a unit root test is to find out the additional lags required to be attached in the VAR(vector autoregressive) model while conducting the Toda Yamamoto test.

Table 1. Augmented Dickey-Fuller (ADF) Test

variables	ADF I(0)	ADF I(I)	Order of integration
Logfi	-2.019029 (-3.488063)	-4.714038 (-3.489117)	I(1)*
Login	-0.179539 (-3.489659)	-3.862521 (-3.489659)	I(1)*
Logvc	-2.232558 (-3.489117)	-5.769962 (-3.489659)	I(1)*
Logmf	0.806706 (-3.489659)	-5.457271 (-3.489659)	I(1)*
Logn100	-2.091315 (-3.486551)	-16.73057 (-3.486551)	I(1)*
Logn200	-2.064003 (-3.486551)	-16.45669 (-3.486551)	I(1)*
Logn500	-2.045309 (-3.486551)	-16.33365 (-3.486551)	I(1)*
Lognauto	-3.004990 (-2.886074)	————	I(0)**
Lognbank	-1.920704 (-3.486551)	-14.82286 (-3.486551)	I(1)*
Lognfmcg	-2.335301 (-3.488585)	-17.15057 (-3.486551)	I(1)*
Lognit	-3.202398 (-2.886074)	—————	I(0)**
lognmedia	-2.332991 (-3.486551)	-14.92758 (-3.486551)	I(1)*
lognpharma	-3.026022 (-2.886074)**	—————	I(0)**
lognprivatebank	-1.852749 (-3.486551)	-14.97740 (-3.486551)	I(1)*
lognreality	-2.121806 (-3.486064)	-12.58058 (-3.486551)	I(1)*

Source: Research findings.

Notes: Figures given in the table are t-statistic and values in parenthesis are the table values of t-stats. *,**,*** specify the statistical significance at 1%, 5% and 10% level respectively.

Table 2. KPSS Unit Root Test

Variables	KPSS	Order of integration KPSS
Logfi	0.063484 (0.739000)	I(1)
Login	0.141226 (0.739000)	I(1)
Logvc	22.00000 (0.739000)	I(1)
Logmf	5.000000 (0.739000)	I(1)
Logn100	0.209789 (0.739000)	I(1)
Logn200	0.192751 (0.739000)	I(1)

Variables	KPSS	Order of integration KPSS
Logn500	0.194460 (0.739000)	I(1)
lognauto	0.492513 (0.739000)	I(1)
Lognbank	0.191328 (0.739000)	I(1)
Lognfmcg	0.435103 (0.739000)	I(1)
lognit	0.328311 (0.739000)	I(1)
lognmedia	0.217005 (0.739000)	I(1)
lognpharma	0.625485 (0.739000)	I(1)
Lognprivate bank	0.241474 (0.739000)	I(1)
lognreality	0.072995 (0.739000)	I(1)

Source: Research findings.

Notes: Figures given in the table are t-statistic and values in parenthesis are the table values of t-stats.

Table 3. Confirmatory Analysis

Variables	Order of integration ADF	Order of integration KPSS	Decision
Logfi	I(1)*	I(1)	Conclusive (non-stationary)
Login	I(1)*	I(1)	Conclusive (non-stationary)
Logvc	I(1)*	I(1)	Conclusive (non-stationary)
Logmf	I(1)*	I(1)	Conclusive (non-stationary)
Logn100	I(1)*	I(1)	Conclusive (non-stationary)
Logn200	I(1)*	I(1)	Conclusive (non-stationary)
Logn500	I(1)*	I(1)	Conclusive (non-stationary)
lognauto	I(0)**	I(1)	Inconclusive
Lognbank	I(1)*	I(1)	Conclusive (non-stationary)
Lognfmcg	I(1)*	I(1)	Conclusive (non-stationary)
lognit	I(0)**	I(1)	Inconclusive
lognmedia	I(1)*	I(1)	Conclusive (non-stationary)
lognpharma	I(0)**	I(1)	Inconclusive
Lognprivate bank	I(1)*	I(1)	Conclusive (non-stationary)
lognreality	I(1)*	I(1)	Conclusive (non-stationary)

Source: Research findings.

Notes: *,**,*** specify the statistical significance at 1%,5%, and 10% levels respectively.

The confirmatory analysis shown in Table 3 is constructed from the two-unit root test as can be seen in Tables 1 and 2. The results of the confirmatory analysis reveal that the variable is stationary at integration order one. Three variables of Auto, IT, and Pharma are coming inconclusive. So, in VAR models one extra Lag will be added when running the Toda Yamamoto model for Wald causality in the financial institution (FI), insurance companies(IN) mutual fund(MF), and venture capital fund(VC).

In addition to Dicky fuller test for unit root, Zivot and Andrews (1992) endogenous structural break test is used for finding out any structural break in data. It is a sequential

test that utilizes the full sample and uses a different dummy variable for each possible break date. The break date is selected where the t-statistic from the ADF test of the unit root is at a minimum (most negative).

Consequently, a break date is chosen where the evidence is least favorable for the unit root null. Literature shows that the presence of a structural break in data can lead to misleading hypothesis results and can reduce the power of the unit root test. For Zivot and Andrews test if the test is not rejected, then the null hypothesis implies the presence of stationarity in data. Table 4 presents the test results of the Zivot and Andrews test, which shows the structural break in monthly data of NSE sectoral indices and four domestic institutional investors FI, MF, VC, and IN.

Table 4. Results of Zivot Andrew test

Variables	**Zivot Andrew test Trend and intercept**
logfi	2015M08
login	2011M05
logvc	2016M10
logmf	2012M11
Logn100	2011M08
Logn200	2011M08
Logn500	2014M05
lognauto	2014M05
lognbank	2011M08
lognfmcg	2012M07
lognit	2013M07
lognmedia	2017M03
Lognpharma	2014M07
Lognprivate bank	2014M05
lognreality	2013M06

Source: Research findings.

The structural breaks given in the list are significant in the context of India. In 2011 there was a sharp drop in the stock markets across the united nations, the Middle East, Europe, and Asia due to fear of the contagion effect of the European sovereign debt crisis. After the Subprime crisis and European sovereign debt, crisis markets were hugely undervalued, and in 2012, the Indian stock market gave the second-highest result globally. In 2013 September again market caught pace due to the announcement of Mr Narendra Modi as the prime ministerial candidate by the Bhartiya Janata party in India. The Win of Mr. Narendra Modi[8] in 2014 increased the confidence in the retail as well as the domestic investors in stock markets. Domestic investors shifted their investments from traditional real estate and gold to the stock markets. The colossal money of investors pooled in mutual funds. In the year 2015, stock markets crashed due to the ripple effect created by the fears over a slowdown in China created due to the devaluation of its currency. Demonetization was the major jolt to the stock markets in 2016 November, but the effect diminished gradually. In February 2017 finance minister Mr Arun Jaitley announced the long-term capital gains tax on the sale of equity investment which led to the withdrawal of money from the stock market of India by

foreign institutional investors and gave a significant negative impact on the stock markets of India. After checking the stationarity or order of integration of the variable, the Andrews Zivot test was performed for any structural break in data. The next step is to check the optimum Lag order for the VAR model according to the several information criteria given. The paper considers the AIC criterion for the lag order selection as in the maximum cases, all information criteria gave the same results, but the value for AIC is minimum, so the AIC criterion is considered. The residual of the selected Lag order of the VAR is checked by applying the LM-test for serial independence against the alternative of AR,(k)/MA(k) for k=1….12. If the LM test has problems of serial correlation, then the lag order can be increased to maximum lag length as shown by the information criterion until the serial correlation is removed. The inverse AR root table is checked for the results which should show that the VAR is stable then only we can move forward for the Wald test for causality.

Now for the confirmation of the long-term relationship between the two variables Johansen's cointegration test is applied(Søren Johansen, 1990). The two test statistic, which is known as trace statistics and eigen-value statistics are used to investigate the cointegrated vectors. Whatever the outcome of the cointegration test, but the outcome of the Toda Yamamoto test is not affected by it.

The final step is to verify the Wald test of causality test. Toda and Yamamoto include the inclusion of $d_{maxextra}$ lags of the twain variable used in causal relation to control for the possible cointegration. The extra lag is treated as the exogenous variable, and coefficients of these lags are not included when subsequent Wald test is conducted. If the coefficient of extra lags is included in the Wald test then Wald statistics would not have its usual asymptotic chi-square null distribution. Toda Yamamoto's causality results are shown in Tables 5 and 6.

Table 5. Toda Yamamoto Causality Results

Dependent Variable: nifty100							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-9.208481	7	Stable	0.1421	no	25.57315	0.0006*
Insurance companies	-10.3859	7	Stable	0.9060	no	23.07394	0.0033*
Mutual fund	-10.57482	8	Stable	0.7092	no	36.86483	0.0000*
Venture capital	-8.324558	2	Stable	0.4408 at lag 4	no	0.253273	0.8811
Dependent Variable: Nifty 200							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-9.186475	7	Stable	0.1126	no	24.99592	0.0008*
Insurance companies	-10.37552	8	Stable	0.9298	no	25.75370	0.0012*
Mutual fund	-10.58246	8	Stable	0.5997	no	41.00577	0.0000*
Venture capital	-8.299565	2	Stable	0.5163 at lag 4	no	0.308328	0.8571
	Dependent Variable: Nifty 500						
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-9.146126	8	Stable	0.7552	no	23.09222	0.0032*

Insurance companies	-10.37901	8	Stable	0.9616	no	25.94125	0.0011*
Mutual fund	-10.58925	8	Stable	0.5802	no	41.88724	0.0000*
Venture capital	-8.294583	2	Stable	0.4672 at lag 4	no	0.256117	0.8798
Dependent Variable: nifty auto							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi square	**Prob.**
Financial institution	-8.890804	8	Stable	0.8353	no	14.79018	0.0634***
Insurance companies	-10.14548	8	Stable	0.8505	no	13.92136	0.0838***
Mutual fund	-10.36293	8	Unstable	0.3171	no	_____	_____
Venture capital	-8.221901	2	Stable	0.8152 at lag 4	no	0.141668	0.9316
Dependent Variable: Nifty bank							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi square	**Prob.**
Financial institution	-8.828669	7	Stable	0.2917	no	28.06964	0.0002*
Insurance companies	-10.10843	8	Stable	0.9699	no	26.90297	0.0007*
Mutual fund		8	Stable	0.4472	no	42.93045	0.0000*
Venture capital	-7.980624	2	Stable	0.0599	no	0.373915	0.8295
Dependent Variable: nifty FMCG							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi square	**Prob.**
Financial institution	-8.938804	6	Stable	0.1369 at lag 7	no	8.770837	0.1869
Insurance companies	-10.20847	8	Stable	0.6857	no	6.706468	0.5686
Mutual fund	-10.37924	8	Stable	0.6012	no	9.625070	0.2923
Venture capital	-8.328758	2	Stable	0.2589	no	0.289901	0.8651
Dependent Variable: nifty IT							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-9.119219	8	Stable	0.3650	no	8.678553	0.3701
Insurance companies	-10.32335	8	Stable	0.9889	no	5.674023	0.6914
Mutual fund	-10.43646	8	Stable	0.9729	no	10.72259	0.2179
Venture capital	-8.583458	2	Stable	0.9252 at lag 4	no	0.434265	0.8048
Dependent Variable: Nifty media							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-8.772013	8	Stable	0.9596	no	12.91793	0.1147
Insurance companies	-10.07052	8	Stable	0.7323	yes	23.24685	0.0031*
Mutual fund	-10.23326	8	Stable	0.5000	no	28.61759	0.0004*
Venture capital	-8.036327	2	Stable	0.3120	no	0.097301	0.9525
Dependent Variable: Nifty Pharma							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-8.950553	8	Stable	0.8189	no	14.25482	0.0754***
Insurance companies	-10.20386	8	Stable	0.8177	no	3.630347	0.8888
Mutual fund	-10.35110	8	Stable	0.9152	no	10.13087	0.2560
Venture capital	-8.373025	2	Stable	0.4844 at lag 4	no	0.031935	0.9842
Dependent Variable: Nifty private bank							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-8.824739	8	Stable	0.2546	no	22.23957	0.0045*

Insurance companies	-10.08733	8	Stable	0.9539	no	21.66654	0.0056*
Mutual fund	-10.27793	8	Stable	0.3551	no	34.64034	0.0000
Venture capital	-8.039893	2	Stable	0.0738	no	0.125591	0.9391
Dependent Variable: Nifty reality							
	AIC	**lag**	**AR-Root**	**LM-test**	**cointegration**	**Block Exogeneity Wald test**	
						Chi-square	**Prob.**
Financial institution	-8.351794	7	Stable	0.1889	no	18.63949	0.0094*
Insurance companies	-9.677631	8	Stable	0.8936	yes	23.16433	0.0032*
Mutual fund	-9.901225	8	Unstable	0.6863	no		
Venture capital	-7.785794	2	Stable	0.0675	no	1.220854	0.5341

Source: Research findings.

Notes: *,**,*** specify the statistical significance at 1%,5%, and 10% levels respectively.

Table 6. Toda Yamamoto Causality Results

Dependent Variable: Mutual fund							
	AIC	lag	AR-Root	LM-test	cointegration	Block Exogeneity wald test	
						Chi-Square	Prob.
Nifty100	-10.57482	8	Stable	0.7092	no	12.60934	0.1260
Nifty200	-10.58246	8	Stable	0.5997	no	12.31768	0.1376
Nifty 500	-10.58925	8	Stable	0.5802	no	12.56737	0.1276
Nifty Auto	-10.36293	8	unstable	0.3171	no		
Nifty Bank	-10.26700	8	Stable	0.4472	no	15.02356	0.0587***
Nifty FMCG	-10.37924	8	Stable	0.6012	no	12.72417	0.1217
NiftyIT	-10.43646	8	Stable	0.9729	no	14.63271	0.0667***
Nifty media	-10.23326	8	Stable	0.5000	no	16.81323	0.0321**
Nifty Pharma	-10.35110	8	Stable	0.9152	no	7.206499	0.5145
Nifty Private Bank	-10.27793	8	Stable	0.3551	no	15.54267	.0494**
Nifty reality	-9.901225	8	unstable	0.6863	no		
Dependent Variable: Insurance Companies							
	AIC	Lag	AR-Root	LM-test	cointegration	Block Exogeneity wald test	
						Chi-Square	Prob.
Nifty100	-10.3859	7	Stable	0.9060	no	3.558285	0.8946
Nifty200	-10.37552	8	Stable	0.9298	no	3.074961	0.9296
Nifty 500	-10.37901	8	Stable	0.9616	no	2.283837	0.9711
Nifty Auto	-10.14548	8	Stable	0.8505	no	3.790371	0.8755
Nifty Bank	-10.10843	8	Stable	0.9699	no	2.778494	0.9475
Nifty FMCG	-10.20847	8	Stable	0.6857	no	3.599826	0.8913
NiftyIT	-10.32335	8	Stable	0.9889	no	9.654375	0.2901
Nifty media	-10.07052	8	Stable	0.7323	yes	3.471525	0.9014
Nifty Pharma	-10.20386	8	Stable	0.8177	no	2.708751	0.9513
Nifty Private Bank	-10.08733	8	Stable	0.9539	No	2.125482	0.9769
Nifty reality	-9.677631	8	Stable	0.8936	yes	2.638374	0.9550
Dependent Variable: Financial Institutions							
	AIC	Lag	AR-Root	LM-test	cointegration	Block Exogeneity wald test	
						Chi-Square	Prob.
Nifty100	-9.208481	7	Stable	0.1421	no	7.349595	0.3934
Nifty200	-9.186475	7	Stable	0.1126	no	7.341531	0.3942
Nifty 500	-9.146126	8	Stable	0.7552	no	6.324534	0.6109

Nifty Auto	-8.890804	8	Stable	0.8353	no	4.986893	0.7590
Nifty Bank	-8.828669	7	Stable	0.2917	no	7.157082	0.4127
Nifty FMCG	-8.938804	6	Stable	0.1369 at lag 7	no	5.961202	0.4276
NiftyIT	-9.119219	8	Stable	0.3650	no	11.95574	0.1532
Nifty media	-8.772013	8	Stable	0.9596	no	6.397979	0.6027
Nifty Pharma	-8.950553	8	Stable	0.8189	no	3.977962	0.8591
Nifty Private Bank	-8.824739	8	Stable	0.2546	no	5.476240	0.7075
Nifty reality	-8.351794	7	Stable	0.1889	no	1.353137	0.9870

Dependent Variable: Venture Capital								
	AIC	Lag	AR-Root	LM-test	MAX lag	cointegration	Block Exogeneity wald test	
							Chi-Square	Prob.
Nifty100	-8.324558	2	Stable	0.4408 at lag 4	6	no	1.836317	0.3993
Nifty200	-8.299565	2	Stable	0.5163 at lag 4	6	no	1.5234462	0.1669
Nifty 500	-8.294583	2	Stable	0.4672 at lag 4	6	no	1.379018	0.5018
Nifty Auto	-8.221901	2	Stable	0.8152 at lag 4	6	no	0.503950	0.7773
Nifty Bank	-7.980624	2	Stable	0.0599	6	no	1.927806	0.3814
Nifty FMCG	-8.328758	2	Stable	0.2589	6	no	1.110847	0.5738
NiftyIT	-8.583458	2	Stable	0.9252 at lag 4	6	no	0.061386	0.9698
Nifty media	-8.036327	2	Stable	0.3120	6	no	0.940604	0.6248
Nifty Pharma	-8.373025	2	Stable	0.4844 at lag 4	6	no	2.400441	0.3011
Nifty Private Bank	-8.039893	2	Stable	0.0738	6	no	1.535701	0.4640
Nifty reality	-7.785794	2	Stable	0.0675	6	no	0.543329	0.7621

Source: Research findings.

Notes: *,**,*** specify the statistical significance at 1%,5%, and 10% levels respectively.

Table 7. Cointegration Results

Cointegration Results with Insurance Companies								
	Hypothesized No. of CE(s)	**Eigen value**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
Nifty media	None *	0.122089	15.76324	12.32090	0.0127	14.45337	11.22480	0.0131
	At most 1	0.011731	1.309868	4.129906	0.2950	1.309868	4.129906	0.2950
Nifty Reality	None *	0.109885	16.70954	12.32090	0.0087	12.92096	11.22480	0.0249
	At most 1	0.033555	3.788573	4.129906	0.0612	3.788573	4.129906	0.0612

Source: Research findings.

Notes: Figures given in the table are t-statistic and values in parenthesis are the table values of t-stats.
*,**,*** specify the statistical significance at 1%,5% and 10% level respectively.

Johansen cointegration test results for the above data are shown in Table 7. The null hypothesis of no cointegration is rejected at a 5 percent level of significance by both the test of maximum eigen value and trace as shown in the findings. One cointegrating equation is indicated by both tests. So we can conclude based on Johansen's cointegration test that there exists a sustainable long-run relationship between insurance

companies vis á vis nifty media and nifty reality. This test guarantees causality in at least one direction.

The results of the Toda Yamamoto non-causality test show that Causality runs from financial institutions (FI) to Nifty 100, Nifty 200, Nifty 500, Nifty bank, Nifty private bank, and Nifty reality at 99% level of confidence and FI to Nifty Auto and Nifty Pharma at 90% level of confidence. As far as insurance companies (IN) are concerned causality runs from them to Nifty 100, Nifty200, Nifty500, Nifty Bank, Nifty media, Nifty private bank, Nifty reality at a 99% level of confidence, and Nifty Auto at 90% level of confidence. IN also shows a long-run relationship between Nifty media and Nifty reality as there is one cointegration equation coming significantly in both cases. At the same time, causality runs from mutual funds (MF) to Nifty100, Nifty200, Nifty500, Nifty Bank, Nifty media, and Nifty private bank at 99% level of confidence. There is no causality running from venture capital funds to any of the sectoral indexes. Mutual funds on the other hand are having a bidirectional relationship with Nifty media, Nifty private bank at a 95% level of confidence as well as Nifty bank at a 90% level of confidence. A unidirectional causality is running from Nifty IT to mutual funds at a 90% level of confidence.

Thus the outcome shows that Causality is flowing from FI, IN, and MF to most of the sectoral indices of the national stock exchange but only mutual funds are affected by some of the sectoral indices whereas there is no causality shown from VC's to any of the indexes. These results are consistence with the results of Arora (2016) where the VAR results of DII with stock returns show a positive effect on stock returns.

Table 8. Correlation Results

Sectoral Indices	Financial institution	Insurance companies	Mutual funds	Venture capital
Nifty100	0.782205*	0.951158*	0.923151*	0.0934393
Nifty200	0.783313*	0.949709*	0.931513*	0.084940
Nifty500	0.780370*	0.952309*	0.936109*	0.083533
Nifty Auto	0.706664*	0.942088*	0.859706*	0.100728
Nifty bank	0.791374*	0.952920*	0.925031*	0.100718**
Nifty FMCG	0.671798*	0.904439*	0.803297*	0.153752
Nifty IT	0.721170*	0.896874*	0.818330*	0.079379
Nifty Media	0.678594*	0.903534*	0.867862*	0.052407
Nifty Pharma	0.550150*	0.809081*	0.680168*	0.148981**
Nifty Private bank	0.754530*	0.962551*	0.914833*	0.118333
Nifty reality	-0.002542	-0.3430779*	-0.168326	-0.255782*

Source: Research findings.

Notes: figures given in the table are correlation coefficients.

*,**,*** specify the statistical significance at 1%, 5% and 10% level respectively.

The results of correlation analysis depict that there is a significant contemporaneous Positive correlation with MF, IN, FI, and VC vis á vis the sectoral indices of India. It is the nifty reality which is showing a negative correlation with all the DII's. The correlation coefficients are quite high in the case of FI, IN, and MF, which supports the results of Toda Yamamoto Causality. The venture capital fund correlation is also

positive, but the coefficient of correlation is very low, making the relationship very weak, with sectoral indexes.

5. Conclusion

This paper investigates the Causality between the flows of Mutual funds, insurance companies, financial institutions, and venture capital fund Vis á Vis the sectoral indices of the national stock exchange. This study is new in the sense that it uses a broad definition of the domestic institutional investors of India. To study the causality, a modified version of the Granger causality test is used, which is Toda & Yamamoto, (1995). The findings indicate unidirectional causality running from FI and IN to Nifty 100, Nifty 200, Nifty 500, Nifty Bank, Nifty Private Bank, and Nifty Reality. In contrast, FI is also causing Nifty Auto and Nifty Pharma, on the other hand, IN is causing Nifty Media also. The results of MF is showing causality from MF to Nifty 100, Nifty 200, Nifty 500, Nifty Bank, Nifty Private Bank, and Nifty Media. In contrast, causality is also running from some of the sectoral indices to MF (Nifty Media, Nifty private bank, Nifty Bank, Nifty IT). VC's are showing no causality to any of the sectoral indices, or any of the sectoral indices are not showing causality to VC's. This implies that DII investments are causing the closing price of the sectoral indices. Correlation analysis is used in this study to find the magnitude of the relationship between DII's and sectoral indices, which came out to be positive and strong. The only exception is the nifty reality with a negative correlation. In addition to this venture capital funds showed a positive but weak correlation with the indices.

Cointegration is only coming in the case of insurance companies with the Nifty media and Nifty reality which confirms the long-run relationship between the two. The results of correlation analysis are showing a high positive correlation with all the sectoral indices except the nifty reality, which is showing a negative correlation with the DII's. The correlation of the venture capital funds with all the indices is positive but very weak.

These results illuminate the vital role played by domestic institutional investors in Indian stock markets. Over the period, the DII investment participation is increasing in the Indian stock market. Their participation in NSE increased to 13.78 percent by value as on 30 June 2019. The gap between investments of FPI (foreign portfolio investors) and DII has been shrinking (Summary, 2019). More and more participation of DII's in India's stock market is increasing the stability of the stock markets as it is the DII's which stabilize the stock market when volatility is created by FII's. Their increased participation will strengthen the stock markets and insulate them from any shocks coming from other foreign stock markets. In this context, the role of policymakers becomes crucial. They should make policies so that the participation of DII's could be increased in the markets in turn, making the markets stable from external shocks. DII's are limited investors; they can only invest up to a limit in the stock markets. Especially the pension funds, insurance companies, and financial institutions. As the results are showing the importance of their contribution to stock markets, it is desired from the policymakers to devise desirable rules to increase the investment corpus of DII.

Policymakers require an uninterrupted supervision method to differentiate between market response to basic principles vis á vis transitory forces so that financial firmness of the stock markets can be ensured while obtaining constructive advantage of the causal relationship running from DII's to Sectoral indices.

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Endnotes

1. The NIFTY 500 Index represents about 96.1% of the free float market capitalization of the stocks listed on NSE as on March 29, 2019.

2. The NIFTY 200 Index is designed to reflect the behavior and performance of large and mid-market capitalization companies. NIFTY 200 includes all companies forming part of the NIFTY 100 and NIFTY Full Midcap 100 index.

3. NIFTY 100 represents the top 100 companies based on full market capitalization from NIFTY 500. This index intends to measure the performance of large market capitalization companies. The NIFTY 100 tracks the behavior of the combined portfolio of two indices viz. NIFTY 50 and NIFTY Next 50.

4. Bombay stock exchange (BSE) is a major stock exchange in India. BSE 100 is an index of the top 100 companies trading in BSE.

5. BSE Sensex is the index of the top 30 companies trading on the Bombay stock exchange in India.

6. Several Eurozone member states were unable to repay by refinancing their government debt or bailing out overindebted banks under their national supervision.

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