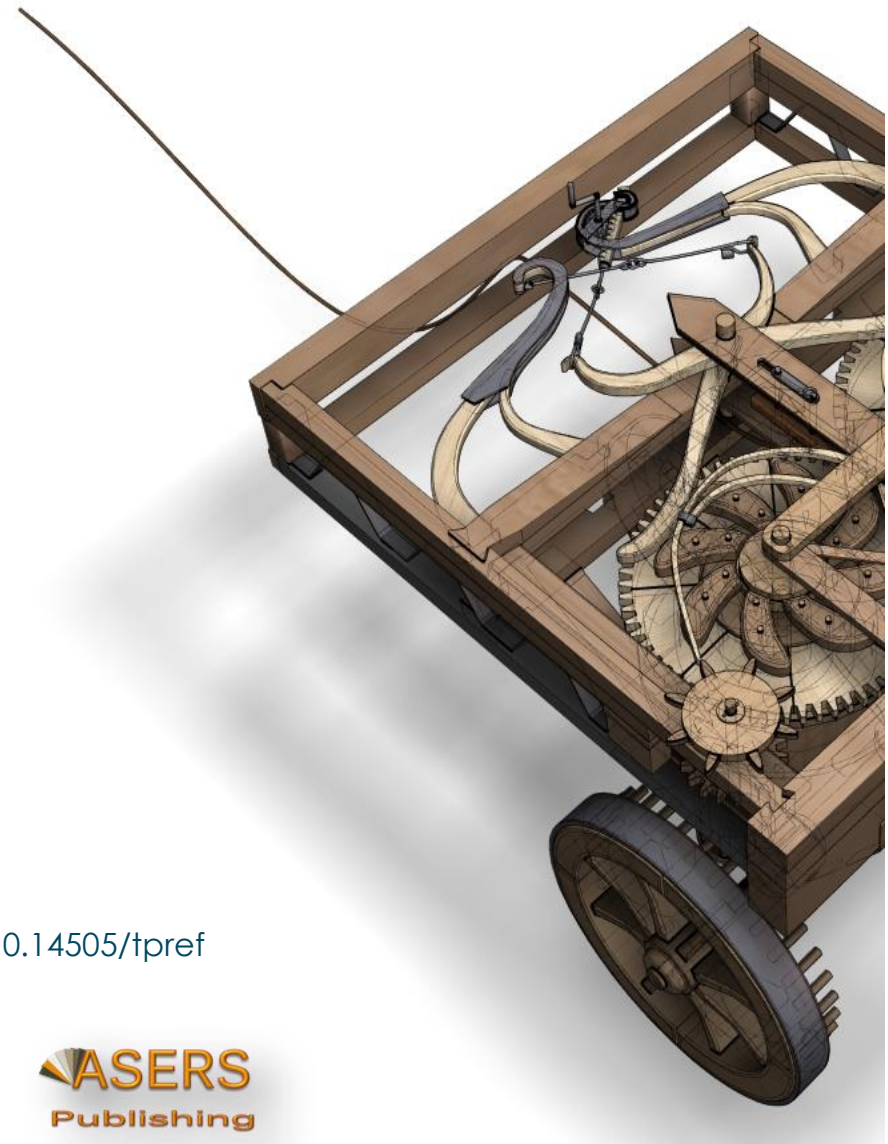
Theoretical and Practical Research in Economic Fields



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Theoretical and Practical Research in Economic Fields

Many economists today are concerned by the proliferation of journals and the concomitant labyrinth of research to be conquered in order to reach the specific information they require. To combat this tendency, **Theoretical and Practical Research in Economic Fields** has been conceived and designed outside the realm of the traditional economics journal. It consists of concise communications that provide a means of rapid and efficient dissemination of new results, models, and methods in all fields of economic research.

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Dynamics and Trading Behaviour of Four Domestic Institutional Investors in Indian Stock Markets

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Abstract: The stability of financial markets is the need of the hour. The runaway of foreign institutional investors has left Indian markets dry many times. Domestic institutional investors (DII) have rescued stock markets during many turbulence-making events. The study focuses on the Trading strategies of four types of DIIs in Indian stock markets: mutual funds, Insurance companies, Development financial institutions, and banks.

A vector autoregressive model is used to study the behavior of Four DII's (insurance companies, development financial institutions, banks, mutual funds) in Indian stock markets on daily data. The data is studied at three levels Buy Sell and Net.

Banks became positive feedback traders whereas mutual funds, insurance companies, and development financial institutions were found as negative feedback traders. These results broke the myth about DII's as only contrarian traders in the Indian context. The study results reveal the significant impact of purchase and sell done by all the DII's on stock returns. At the Net investment level, it is Mutual funds and development financial institutions impacting the stock market. Buying done by banks also creates price pressure in the markets.

It is the first paper in the Indian context to study the domestic institutional investor's data at the disaggregated level. The daily data is taken from the Securities Exchange Board of India (SEBI) on special requests under the regulatory authority's data-sharing policy. Such a bifurcation study on trading strategies is mostly done in the U.S. and Japan to the best of my knowledge. The research on DII at the bifurcated level may include pension funds, Hedge fund, Venture capital funds, and REITs in future research

Regulatory authorities should make policy changes so that Insurance companies, Development financial institutions, mutual funds, and banks can increase their investment corpus in stock markets as their investment is having a positive effect on stock markets.

Investor awareness programs against panic selling in mutual funds will benefit investors as they will be able to gain more earnings from their mutual funds' investments. Insurance awareness programs will not only increase their investment corpus but also make society self-reliant.

Keywords: domestic institutional investors; mutual funds; insurance companies; development financial institution; banks; positive feedback trading; negative feedback trading.

JEL Classification: G23; C22.

Introduction

The trading pattern of institutional investors and their impact on stock markets have been the focusing area of research for academicians, policymakers, and researchers. This paper examines the trading behavior of Domestic institutional investors (DII) in Indian capital markets at a disintegrated level. Some researchers found that domestic institutional investors do not show a distinct buying pattern at a combined level, which presents heterogenic behaviour concerning their investment objectives and their information review skill (Mishra & Debasish, 2017) so it is crucial to study them at disintegrated levels. While others have found that at the aggregate level, DII shows a contrarian trading strategy (Chauhan & Chaklader, 2020,Mishra & Debasish, 2017, Arora, 2016, Naik & Padhi, 2014, Thenmozhi & Kumar, 2009, B. H. Boyer & Zheng, 2002). However, trading strategies at the disintegrated level are yet to be explored.

After the economic reform of 1991, the Indian equity market becomes more competitive because of the participation of institutional investors (foreign and domestic). South Asian markets are more integrated with international markets (Kumar & Dhankar, 2017) which is opening doors for FII's. DII (Banks, Mutual funds, development financial institutions, insurance companies, pension funds) channel the savings of a local nature in equity markets. Domestic institutional investors (DII) and Foreign institutional investors (FII) both investors constitute a significant portion of investment in Indian financial markets (Andrieş *et al.* 2023). Money invested by FII is known as hot money as it can be easily pulled out to leave the market dry, but DII are more stable investors (Mishra & Debasish, 2017, Vo, 2016)

In emerging economies like India majority of people are uneasy about investing money directly into the stock market, and here, the role of domestic institutional investors becomes essential because they become the critical factor in channeling the domestic savings into stock markets.

The results of much empirical literature (Ng & Wu, 2007,) Grinblatt & Keloharju, 2000) divide the investors' responses to the stock market trend and techniques of managing their portfolio into two categories first is negative feedback trading, and the second is Positive feedback trading. Contrarian behavior of investment (negative feedback trading) is when the investor sells those stocks that have ascending movement and buys those that show descending movement. On the other hand, in the Price momentum strategy (positive feedback strategy), the investors buy the ascending stock and sell the descending stock. Another phenomenon that influences the trading behavior of the investors' groups is the information asymmetry among these groups, which makes them make differing investment decisions (*e.g.* Ahmed, 2014; Phansatan *et al.* 2012 ; de Haan & Kakes, 2011; Bose, 2012). One more flow relationship approach is the price pressure hypothesis (Harris & Gurel, 1986) which postulates that contemporaneous stock returns are positively related to flows when flows increase stock returns also increase. If one set of investors have some private information about the market and they increase their inflow, then the less informed investors also follow the wave as they assume that the current market prices are below the rates at the fundamental level, this aggregate purchase will increase the overall cost, which is information revelation hypothesis (Lee, Charles ; Shleifer, Andrei ; Thaler, 1991).

It is assumed that asset prices reflect information owned by noise traders and informed investors in inefficient markets (Black, 1986). The informed investors look for mispriced stocks, whereas noise traders pump volatility and liquidity in the markets. Investments of aware investors provide stability and decrease volatility but are not able to stop the effect created by noise traders (Thaler, 1999). Positive feedback traders believe that the current market scenario will prevail, so they behave like noise traders and keep buying (selling) the stock. (Bohl & Siklos, 2008) compared the positive and negative feedback trading behaviour in emerging and mature markets and found a high presence of feedback trading in emerging markets in comparison to mature markets. (Dai & Yang, 2018) studied the relationship between positive feedback trading and sentiments; the findings show that when prices of the most stock move ahead together, then positive feedback traders trade. Institutional investors don't need to always take on a positive feedback trading strategy (Lakonishok, Shleifer, & Vishny, 1992), a study

on pension funds and monetary funds by (Irvine, Lipson, & Puckett, 2007) show the presence of negative feedback strategy by institutional investors.

At the disintegrated level, we found no studies in the Indian context regarding the trading strategies DII. This paper is an attempt to analyze the trading strategies of domestic institutional investors in the Indian stock market at a disaggregated level which includes insurance companies (INSU), development financial institutions (DFI), banks, mutual funds (MF) in the national stock exchange (NSE) of India. Investment behaviour of DII's at the disaggregated level.

Hypothesis

H01: No significant evidence of momentum trading/contrarian trading by DII at a disintegrated level in Indian stock market exist.

H02: No significant causality among the Nifty returns and DII investment behaviour at disintegrated level exists in Indian stock markets.

The rest of the paper is organized as follows. The literature review covers the second section with the third section containing the data and methodology part. The fourth section discusses the empirical findings, leading to a summary and conclusion in the fifth section.

1. Literature Review

Lakonishok, Shleifer, & Vishny, (1992) studied the behaviour of pension funds as institutional investors in the United States. They found that these investors usually trade in large market capitalization stocks and more herding behaviour and positive feedback trading is shown for small market capitalization stocks as less information is available for small stocks. Nofsinger & Sias (1999) confirm the positive feedback trading pattern of domestic institutional investors in the United States. The data under study was from 20 years till 1996, and foreign institutional investors were excluded. The outcome reveals that the positive feedback trading behaviour of DII is instrumental in contributing towards a positive relationship of stock returns with changes in institutional ownership. Cai & Zheng (2004) covered a data set of bank insurance companies, mutual funds, and investment advisors as institutional investors. The paper confirms the positive feedback trading behaviour of institutional investors mainly during purchases than in redemption whereas there is a negative relation of stock returns with lagged institutional trading. Berko (1997) found positive contemporaneous relationship between stock returns and equity flowed when he analyzed Mexican data.

Griffin, Harris, & Topaloglu (2003) studied the relation between trading activities of institutional and individual investors with past stock returns in Nasdaq 100, which exhibit that both follow trades of past stock returns. There was a positive contemporaneous relationship with the institutional and negative contemporaneous relationship with individual investors. B. H. Boyer & Zheng (2002) examined the connection between institutional trading, and stock returns data from the United States for 44 years until 1996. The data consists of quarterly purchases done by mutual funds, insurance companies, pension funds, foreign investor's households, and other institutional investors. The results indicate a positive correlation of stock returns with foreign investors, mutual fund, and pension funds, which depicts that these investors can create some price pressure in the market, but the presence of Granger causality was not there in any direction. The paper also analyses the movement of cash flow by institutional investors in the bull and bear market. The regression values show that pension funds and foreign investors move with the market return in the bull market showing the presence of positive feedback trading and mutual funds move with market return in the bear market showing their contrarian trading behaviour. Sias, Starks, & Titman (2005) observed in the New York stock exchange that there exists a correlation between stock returns and institutional trading, and they are informed, traders. Rakowski & Wang (2009) analyses daily mutual funds and monthly mutual funds in a VAR environment. Daily funds do not chase hot funds and have contrarian trading strategies, but the monthly mutual fund is showing no relation with returns. This predicts that the driving force of mutual funds in the short run and the long run is different. Baik, Kang, & Kim (2010) found that the return forecasting power of local institutional investors in the United States was statistically more significant than non-local investors. The local investors include investment advisors, mutual funds, banks, and insurance companies over 12 years till 2007.

Some studies from European countries show local investors as informed traders. Alexakis, Niarchos, Patra, & Poshakwale (2005) studied daily mutual funds from a period 1994 to 2003 in the Athens stock exchange of Greece, where the results revealed bidirectional causality between stock returns and mutual funds. Bohl, Brzeszczyński, & Wilfling (2009) used daily data of the Polish stock market from 1994 to 2003 to study the impact of trading done by institutional investors on the dynamics of the stock market return. Markov-switching-GARCH Model is used in this study, the results of which show that stock market volatility is reduced by the informed

trading of pension funds who adjust the stock prices to new information, in turn acting as stabilizers for the stock market. de Haan & Kakes (2011) observed the behaviour of life insurers, non-life insurance, and pension funds in Dutch markets from 1999 to 2005. The results show that pension funds follow a constant contrarian trading strategy, whereas the other two institutional investors, life insurers become contrarian when they have more pool of money from unit-linked policy and non-life insurers become contrarian when they have a business model which is relatively risky.

Yang (2002) in his study, shows a negative correlation of stock returns and domestic mutual funds in Taiwan stock exchange with daily data of 787 days. The paper utilizes a VAR-ECM model to find out the short-run and long-run behaviour. The analysis of this paper shows that market returns granger cause domestic institutional investors, and they follow the trend of foreign investors. Kamesaka, Nofsinger, & Kawakita (2003) bifurcated the institutional investors into foreign investors, security firms, Banks, Insurance firms, Investment trust, Companies, and individual investors, a weekly data set covering 17 years till 1997 in Tokyo stock exchange. Insurance firms, Investment trust, and banks showed negative feedback trading behaviour in the short-run but the coefficient was positive in the long run, which indicates positive feedback trading in the long term. Oh & Parwada, (2007) inspect mutual funds in Korean stock exchange from the period of 1996 to 2003 with the help of the VAR model. A significant negative correlation is between the net mutual fund and returns which is the indication of negative feedback trading. Purchasing mutual funds bears a strong relationship with market returns and purchase is also having information about the returns as bidirectional Granger causality is running between purchase and return in the Korean stock market. In Sri Lanka, the research on institutional data of Colombo stock exchange finds (Samarakoon, 2009) positive feedback trading behavior during purchase and negative feedback trading behavior for sells but the pattern is reversed in times of crises. The results also show the purchase of institutional investors leads to higher returns but on the other hand, the returns impact the purchase and sale of domestic institutional investors more than the purchase and sell of foreign institutional investors. H. Cha (2018) while studying the relationship between Korean stock market return and equity mutual funds with the help of monthly data from 1995 to 2016, the author found a contemporaneous positive correlation between the two.

Talking about Indian markets, (Thenmozhi & Kumar, 2009) while studying the dynamic relationship between stock market returns and mutual fund flows on the daily data from 2001 to 2008 observed that there is a positive relationship between them, but the causality was running from stock market returns to mutual funds and not vice-versa, which reflects negative feedback behaviour of mutual funds. A positive relationship with the stock market volatility and mutual fund flow is seen under the VAR environment that shock in mutual fund flow affects market volatility positively. R. Acharya & Thiripalraju (2011) examined the relationship of Mutual fund and FII with Bombay stock exchange in Indian Markets covering nine years till 2009 with daily data. The author found that mutual funds are followers of their trading strategies as they have a positive relationship with their lags. The study was divided into three study periods; they are 2000-2003, 2004-2007 and 2008-2009. There is bidirectional causality shown in the first two periods between returns and flows, but in the last period, causality is running from returns to flows only. Bose (2012) examined daily data of institutional investors in the Indian stock market from the period of 2008 to 2012 in a multivariate VAR framework. The findings of the study reveal that mutual funds follow the investment pattern of their lags, a contrarian trading strategy, and granger causality is running from by BSE returns to mutual funds.

Naik & Padhi (2014) examined the dynamics between stock market movement and institutional investors with daily data of 10 years till 2012. The results reveal that institutional investors follow their past strategies and mutual fund flows are associated with stock returns. Arora (2016) observed the trading behaviour of FII and DII in Indian stock markets. The results obtained reflected contrarian trading strategy for DII and momentum trading strategy for FII and future stock returns were having a significant positive relationship with DII. The paper documents DII's as sentiments traders as they follow an inverse trading strategy than FII's. (Mishra & Debasish, 2017) the paper relates to the trading behaviour of institutional investors in Indian stock markets covering a period of 2007 to 2016. In a VAR environment, the author finds that DII's are having an indistinct buying behaviour at the aggregate level. The DII consists of banks, mutual funds, financial institutions, insurance companies, and each of them has a different objective of investment and information analysis skills. On the other hand, the sells done by the DII's show the contrarian behaviour of selling meaning that they sell high performing shares. The variance decomposition analysis reveals that DII purchase defines the market return more than vice versa, whereas the DII sell is more defined by the market return. The results show that market returns and DII both have an impact on each other.

Chakraborty & Kakani (2016) studies the impact of the second moment of volume traded by institutional investors (DII+FII) on market volatility in a Markov switching framework by applying the Generalized orthogonal

multivariate GARCH model. Data of four countries, namely India, Taiwan, Korea, and Vietnam, are used from a period of 2000-2012, showing asymmetric information flow in both types of institutional investors across the four countries. The results of the paper show that the volume dispersion of institutional investors is affected by the market volatility and FII's are more affected by market volatility in comparison to DII, proving that DII's are more stable investors. The study also reveals that FIIs destabilizes the market in case of bad news by creating more volume dispersion in comparison to domestic institutional investors. Ferreira, Matos, Pereira, & Pires (2017) investigated the data for institutional investors of 32 countries and found that in countries with less efficient stock markets, non-English speaking and high information asymmetry local institutional investor is making informed investments. Chauhan & Chaklader (2020) also found mutual funds as values investors and Tom Jacob (2019) found their positive influence on stock returns. Major stock Indexes as well as sectoral indices in Indian stock markets also represent behavioural dependence on the Investment pattern of DII's (Srivastava & Varshney, 2023; Suneetha & Aithal, 2024)

From the review of the above literature, it is evident that a majorly contrarian trading strategy is followed by DII in stock markets, but inconsistencies also exist in the results. This may be due to changes in the economic nature of countries, frequency of the observations, sample periods, the methodology adopted, and due to the cognitive capability of the investors. As far as the Indian scenario is concerned, the DII is always represented by mutual funds in almost all papers; only very few articles have considered the data of DII, which contain consolidated data of mutual funds, banks, insurance companies, and Development financial institutions which come under the ambit of DII. Still, none of the studies has taken into consideration the DII data in a disintegrated level, which means banks, insurance companies, mutual funds, and development financial institutions, are studied separately for the leading stock exchange of India, *i.e.* NSE. So, the objective of this paper is to study the trading strategies of DII at a disintegrated level.

2. Data Description and Methodology

The data source for the study is the Securities Exchange Board of India (SEBI), from where the data for Mutual funds, Insurance companies, Development financial institutions, and Banks are collected. The data covers ten years, from January 2012 till December 2022, with daily frequency. The daily data helps to achieve greater precision in explaining non-contemporaneous and contemporaneous relation (Froot, O'Connell, & Seasholes, 2001). Data contains purchase, sell, and net (difference of purchase and sell) Prices of four major domestic institutional investors of Indian equity markets:

1) Mutual funds (MF): Private sector and public sector
2) Insurance companies (INSU):
   i. Life insurance companies: Private and Public sector
   ii. General insurance companies: Private and public sector
3) Development financial institutions (DFI): organizations owned by the government or charitable institutions to provide funds for low-capital projects or where their borrowers are unable to get it from commercial lenders. For example, Industrial Corporation of India established in 1948, Industrial Credit and Investment Corporation of India Limited established in 1955, Industrial Development Bank of India was set up in 1964, Industrial Reconstruction Corporation of India was set up in 1971, Small Industries development bank of India was established in 1989, Export-Import Bank was established in January 1982, National Bank for agriculture and rural development was established in July 1982, and National Housing Bank was established in 1988.
4) commercial banks.

Data for the Index of National Stock Exchange (NSE) nifty 50 is collected from the official website of NSE. It is a well-diversified index and is calculated as a weighted average of 50 Indian companies covering over 17 sectors. The closing prices of the nifty 50 index are converted into returns as $NSER_t = \log(close_t / close_{t-1})$ where $NSER_t$ is the return compounded at time t, and $close_{t-1}$ and $close_t$ are the stock index on two continuous days t-1 and t, respectively.

All the flow variables are normalized by 90 90-day moving average of Nifty 50 market capitalization such that control for market and fund growth is applied as per (Warther, 1995, Oh & Parwada, 2007, Thenmozhi & Kumar, 2009, B. Boyer & Zheng, 2009, R. Acharya & Thiripalraju, 2011 and Naik & Padhi, 2015). As market fundamental behaviour affects stock market (Chang *et al.* 2020). Three market fundamental variables are used in the study which is the exchange rate (IND(INR) v/s USA ($)), call money rate used as a proxy to short-term interest rate, and the dividend yield (H. J. Cha & Lee, 2001, Oh & Parwada, 2007, Thenmozhi & Kumar, 2009, Naik & Padhi, 2014). The daily data of the first two variables are collected from the Reserve Bank of India (RBI), and the third variable is collected from the website of NSE.

The VAR method is employed for analysis. First, the relationship between flow variables and returns is developed, and then the causality analysis is done. The VAR model helps to find out whether past returns can predict future flows and vice versa. In this model, stock return and equity flows are endogenous variables. Market fundamentals are exogenous variables. Every endogenous variable is explained with the help of lagged values of other variables and its own lagged values. If any of the flow variables affect the stock returns indirectly in the presence of market fundamentals (*i.e.* information effect), then that means the flows contain additional information about return and if not then flows only respond to the stock market returns (H. J. Cha & Lee, 2001). The VAR system empowers to predict the stock returns with the help of past equity flows while controlling for information which is in their previous stock return and vice versa. It is one of the most flexible models for the analysis of multivariate time series and useful for describing dynamic behaviour. The VAR model, which includes the exogenous variable, can be defined as follows in the general form.

$$y_t = \alpha_0 + B_1 y_{t-1} + B_2 y_{t-2} + \cdots \ldots + B_p y_{t-p} + \gamma E_t + \varepsilon_t \; ; t = 1,2,3 \ldots, T \quad (1)$$

The measured variable in the above equation (1) y_t = (y_{1t} , y_{2t} , y_{3t}……y_{nt}) is a vector of an endogenous variable in the system. The α_0 represents a nx1 vector of constant. The (nxn) matrix of coefficients are B_1 B_2……B_p; E_t is (nx1) matrix of exogenous factors, and γ are a coefficient matrix of exogenous variable respectively and ε_t is (nx1) the white noise error. To select the VAR lag order minimum value of lag selection criterion Akaike information criterion (AIC) is taken into consideration. In the first VAR system (model) purchase and sell value of DII and Nifty returns are used and in other VAR system (model 2) the net value of the flow variables is used with nifty. In the next step, a granger causality block exogeneity test shows the direction of causality. If causality runs from flows to return, then this supplements the price pressure hypothesis as this means that flows directly affect the returns (Oh & Parwada, 2007). After applying the VAR model, the impulse response function presents the response of institutional investors to innovations in stock returns and vice-versa.

2.1 Relationship of Mutual Funds, Insurance Companies, Development Financial Institutions, and Banks with Stock Returns

This section covers the dynamic interaction of stock returns and all the four types of DII flows of the study in a VAR framework. Considering the four sets of investment flows (MF, INSU, Banks, and DFI) as interdependent and forming an endogenous part of VAR system with stock returns we will estimate two VAR model, first with the sell and purchase values of MF, INSU, Banks, and DFI with stock returns (model 1) and second with net values (purchase-sell) of all the four types of DII and stock returns (model 2). The equation for the VAR model is as follows.

$$NSER_t = \alpha_1 + \sum_{i-1}^{p} B_{1i}\ NSER_{t-1} + \sum_{i-1}^{p} \gamma_{1i}\ mf_{t-1} + \sum_{i-1}^{p} \delta_{1i}\ dfi_{t-1} + \sum_{i-1}^{p} \theta_{1i}\ insu_{t-1} + \sum_{i-1}^{p} \lambda_{1i}\ bank_{t-1} + \mu_1\, dExrate_t + \nu_1\, dint_t + \rho_1 div_t + \varepsilon_t^{NSER} \quad (2)$$

$$mf_t = \alpha_2 + \sum_{i-1}^{p} B_{2i}\ NSER_{t-1} + \sum_{i-1}^{p} \gamma_{2i}\ mf_{t-1} + \sum_{i-1}^{p} \delta_{2i}\ dfi_{t-1} + \sum_{i-1}^{p} \theta_{2i}\ insu_{t-1} + \sum_{i-1}^{p} \lambda_{2i}\ bank_{t-1} + \mu_2\, dExrate_t + \nu_2\, dint_t + \rho_2 div_t\ \varepsilon_t^{mf} \quad (3)$$

$$insu_t = \alpha_3 + \sum_{i-1}^{p} B_{3i}\ NSER_{t-1} + \sum_{i-1}^{p} \gamma_{3i}\ mf_{t-1} + \sum_{i-1}^{p} \delta_{3i}\ dfi_{t-1} + \sum_{i-1}^{p} \theta_{3i}\ insu_{t-1} + \sum_{i-1}^{p} \lambda_{3i}\ bank_{t-1} + \mu_3\, dExrate_t + \nu_3\, dint_t + \rho_3 div_t + \varepsilon_t^{insu} \quad (4)$$

$$dfi_t = \alpha_4 + \sum_{i-1}^{p} B_{4i}\ NSER_{t-1} + \sum_{i-1}^{p} \gamma_{4i}\ mf_{t-1} + \sum_{i-1}^{p} \delta_{4i}\ dfi_{t-1} + \sum_{i-1}^{p} \theta_{4i}\ insu_{t-1} + \sum_{i-1}^{p} \lambda_{4i}\ bank_{t-1} + \mu_4\, dExrate_t + \nu_4 dint_t + \rho_4 div_t + \varepsilon_t^{dfi} \quad (5)$$

$$Bank_t = \alpha_5 + \sum_{i-1}^{p} B_{5i}\ NSER_{t-1} + \sum_{i-1}^{p} \gamma_{5i}\ mf_{t-1} + \sum_{i-1}^{p} \delta_{5i}\ dfi_{t-1} + \sum_{i-1}^{p} \theta_{5i}\ insu_{t-1} + \sum_{i-1}^{p} \lambda_{5i}\ bank_{t-1} + \mu_5\, dExrate_t + \nu_5\, dint_t + \rho_5 div_t + \varepsilon_t^{bank} \quad (6)$$

$NSER_t$ represents the market return variable at time t. The flow variables are f, $insu_t$, dfi_t $Bank_t$ which represents the Purchase sell and net of the domestic institutional investors. $dExrate_t$, int_t are the first difference in the exchange rate and interest rate and div_t denotes the dividend yield variable. We consider all four sets of investment flows to be interdependent, so they form an endogenous part of the VAR system. $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ and α_5 are the intercepts; B,γ,δ,λ,μ,ν, and ρ are the parameters which need to be estimated; ε_t^{NSER}, ε_t^{mf}, ε_t^{insu}, ε_t^{dfi} and ε_t^{bank} are the error terms and p denotes the lag length in the equation. In equation (3) mutual funds purchase, sell or net granger cause returns if null hypothesis for joint significance of $\gamma_{11} = \gamma_{12} =$…… $\gamma_{1p} = 0$ holds. Granger causality of equation (4), (5) and (6) are tested in the same way.

3. Empirical Findings

This section first holds the descriptive statistics of the variables under study in Table 1. All the series are highly deviated from their mean values as the standard deviation values are very high. Mutual funds seem to be the most top investors in terms of value, followed by Insurance companies, banks, and development financial institution (DFI). The values of skewness are almost near to 0 but kurtosis is not near to the standard value of 3. Heavily tailed leptokurtic values of kurtosis confirm the presence of outliers which means the behaviour of these investors is uncertain and its magnitude can vary up to any level.

Table1. Descriptive Statistics

	NSECLOSE	Dividend yield	call money	exchange rate
Mean	7421.055	1.293	6.531	59.122
Median	7355.025	1.28	6.48	61.866
Maximum	12271.8	2.18	11.77	74.387
Minimum	2573.15	0.900	2	43.948
SD	2364.701	0.195	1.57	8.895
Skewness	0.299	0.315	-0.502	-0.337
Kurtosis	1.988	3.715	3.112	1.708
J B test	156.3576 (0.000)	99.403 (0.000)	111.99 (0.000)	232.154 (0.000)

	Bank_buy	Bank_Sell	Bank_net	MF_buy	MF_sell	MF_net
Mean	15.03025	15.3025	-0.272	25.458	25.069	0.389
Median	15.07776	14.055	-0.063	11.89	11.798	0.122
Maximum	132.999	125.404	84.835	305.257	337.946	34.248
Minimum	0.0095	0.0048	-86.502	0.000	0.000	-73.724
SD	13.696	15.267	9.968	37.944	39.141	6.228
Skewness	1.1376	1.767	-0.785	3.6725	4.03	-1.708
Kurtosis	6.3184	8.837	13.924	18.224	21.583	24.411
J B test	1832.110 (0.000)	5270.029 (0.000)	13785.89 (0.000)	32334.23 (0.000)	46434.18 (0.000)	53204.45 (0.000)

	DFI_buy	DFI_sell	DFI_net	INSU_BUY	INSU_sell	INSU_net
Mean	0.309	0.331	-0.022	5.654	6.03	-0.375
Median	0.204	0.226	-0.0178	5.11	5.711	-0.409
Maximum	4.974	12.558	3.467	36.99	27.293	16.582
Minimum	0.000	0.000	-11.225	0.000	0	-16.002
SD	0.372	0.421	0.44	2.861	3.356	2.929
Skewness	4.031	10.856	-5.63	1.896	1.056	0.3377
Kurtosis	28.429	10.856	167.819	12.527	12.438	4.929
J B test	80535.24 (0.000)	8105758 (0.000)	3088588 (0.000)	11900.59 (0.000)	1485.819 (0.000)	472.851 (0.000)

Source: Research Findings

Note: the value in the table represents the t statistic and the value in parentheses is the probability for Jarque Bera test (JB) at 1 per cent level of significance

Before we move forward to estimate the empirical model, we need to check the stationarity of the variables to eliminate all the likelihood of spurious regression problems. The results of the Augmented dicky fuller test (ADF) shown in Table 2. admit that all the variables are stationary at level except Mutual fund Buy, mutual fund sell, interest rate, exchange rate, and Nifty 50 index are which are stationary at first difference.

Table 2. Results of Unit root test

Series	ADF Unit Root Test (level)				Remark
	None	With Intercept	With trend and intercept	First difference	
Bank Buy	-1.042 (0.268)	-2.475 (0.121)	-4.422 (0.002)		I(0)
Bank Sell	-1.901 (0.054)	-3.566 (0.006)	-13.239 (0.000)		I(0)
Bank Net	-39.331 (0.000)	-39.347 (0.000)	-39.347 (0.000)		I(0)
Insurance companies Buy	-1.712 (0.082)	-10.041 (0.000)	-15.127 (0.000)		I(0)
Insurance companies Sell	-1.380 (0.155)	-7.196 (0.000)	-14.033 (0.000)		I(0)
Insurance companies Net	-10.724 (0.000)	-10.930 (0.000)	-11.175 (0.000)		I(0)
Mutual funds Buy	-0.070 (0.0753)	-0.895 (0.788)	-2.877 (0.170)	-25.333 (0.000)	I(1)
Mutual funds Sell	-0.070 (0.7051)	-0.991 (0.785)	-2.867 (0.1730)	-25.496 (0.000)	I(1)
Mutual funds Net	-18.42 1(0.000)	.-18.417 (0.000)	-18.416 (0.000)		I(0)
Development financial institution Buy	-3.872 (0.000)	-10.612 (0.000)	-11.257 (0.000)		I(0)
Development financial institution Sell	-5.090 (0.000)	-23.614 (0.000)	-24.066 (0.000)		I(0)
Development financial institution Net	-52.457 (0.000)	-52.588 (0.000)	-52.633 (0.000)		I(0)
NSE close price	1.943 (0.988)	-0.679 (0.850)	-2.874 (0.1711)	-48.763 (0.000)	I(1)
Exchange rate	1.400 (0.960)	0.559 (0.876)	-2.585 (0.286)	38.176 (0.000)	I(1)
Interest rate	0.151 (0.631)	-2.059 (0.261)	-1.912 (0.647)	-21.128 (0.000)	I(1)
Dividend yield	-1.394 (0.152)	-3.845 (0.002)	-3.812 (0.116)		I(0)

Source: Research findings

Note: the value in the table represents the t statistic and the value in parentheses is the probability. All values are significant at 1% significance I(1) means integrated of order1, I(0) means integrated of order 0.

Table 3. Selection of Lag Length

VAR lag order selection criteria (model 1)						
Endogeneous variables : DFI equity Purchase and sale investment , MFequity Purchase and sale investment, INSUequity Purchase and sale investment, Banks equity Purchase and sale investment and nifty return						
Lag	LogL	sequential modified LR test statistic	FPE: Final prediction error	AIC: Akaike information criterion	SC: Schwarz information criterion	HQ: Hannan-Quinn information criterion
0	158745.2	NA	1.55E-64	-121.3837	-121.3029	-121.3545
1	162097.2	6670.525	1.27E-65	-123.8854	-123.6228	-123.7903
2	162793.7	1381.311	7.95E-66	-124.3562	-123.9118	-124.1952
3	163124.1	652.944	6.57E-66	-124.5469	-123.9207*	-124.3201
4	163333.7	412.7684	5.96E-66	-124.6453	-123.8373	-124.3526*
5	163485.1	297.1351	5.64E-66	-124.6991	-123.7093	-124.3406
6	163619.8	263.4868	5.42E-66	-124.7402	-123.5686	-124.3158
7	163746.6	247.0943	5.23e-66*	**-124.7752***	-123.4219	-124.285
8	163816.6	135.9165*	5.28E-66	-124.7668	-123.2317	-124.2107

Source: Research findings
Note: *Indicates lag order selected by the criterion.
Bold: Indicates optimum lag selection which is adopted for further analysis

Table 4. Selection of Lag Length

VAR lag order selection criteria (model 2)						
Endogeneous variables : DFI equity net investment , MFequity net investment, INSUequity net investment, Banks equity net investment and nifty returns						
Lag	LogL	sequential modified LR test statistic	FPE: Final prediction error	AIC: Akaike information criterion	SC: Schwarz information criterion	HQ: Hannan-Quinn information criterion
0	82635.16	NA	2.49E-34	-63.18559	-63.1407	-63.16933
1	83303.91	1332.896	1.52E-34	-63.67794	-63.57695	-63.64136
2	83436.65	264.0531	1.40E-34	-63.76034	-63.60324*	-63.70344
3	83506.63	138.9443	1.35E-34	-63.79475	-63.58153	-63.71751*
4	83545.64	77.30691	1.34E-34	-63.80546	-63.53614	-63.70791
5	83571.69	51.51656	1.34E-34	-63.80626	-63.48083	-63.68838
6	83602.85	61.51025	1.33e-34*	**-63.81097***	-63.42943	-63.67277
7	83623.81	41.29691	1.34E-34	-63.80788	-63.37023	-63.64936
8	83647.57	46.72871*	1.34E-34	-63.80694	-63.31318	-63.62809

Source : Research findings
Note: *Indicates lag order selected by the criterion
Bold: Indicates optimum lag selection which is adopted for further analysis

Table 5. VAR Granger Causality/Block Exogeneity Wald test

Dependent variable: NSER					Dependent variable: NSER			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
DFI_NET	3.353208	6	0.7634		DFI_SELL	5.072537	7	0.6511
MF_NET	2.971491	6	0.8124		DFI_BUY	2.966327	7	0.8881
BANKNET	2.579095	6	0.8595		D(MF_BUY)	2.116615	7	0.9531
INSUNET	3.109434	6	0.795		D(MF_SELL)	2.017592	7	0.9589

					INSU_SELL	8.543685	7	0.2871
All	11.56773	24	0.9844		INSU__BUY	7.394064	7	0.389
					BANK_SELL	0.806633	7	0.9974
					BANK_BUY	14.25842	7	0.0468
					All	49.84985	56	0.7055

Source: Research findings
Note: INSU, DFI, MF represents insurance companies, development financial institution and mutual funds respectively

Table 6. VAR Granger Causality/Block Exogeneity Wald test

Dependent variable: DFI_SELL					Dependent variable: DFI_BUY			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	2.705996	7	0.9108		NSER	14.14503	7	0.0487
Dependent variable: D(MF_SELL)					Dependent variable: D(MF_BUY)			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	30.19651	7	0.0001		NSER	16.56984	7	0.0204
Dependent variable: INSU_SELL					Dependent variable: INSU__BUY			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	42.74749	7	0.0000		NSER	21.35777	7	0.0033
Dependent variable: BANK_SELL					Dependent variable: BANK_BUY			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	17.7957	7	0.0129		NSER	8.143698	7	0.3201
Dependent variable: DFI_NET					Dependent variable: MF_NET			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	10.53142	6	0.104		NSER	105.6826	6	0.0000
Dependent variable: BANKNET					Dependent variable: INSUNET			
Excluded	Chi-sq	df	Prob.		Excluded	Chi-sq	df	Prob.
NSER	10.13898	6	0.1189		NSER	47.92464	6	0.0000

Source: Research findings
Note: INSU, DFI, MF represents insurance companies, development financial institution and mutual funds respectively

To study the multivariate VAR model, we adopted optimum lag based on AIC criteria. Lag Length for the model 1 and model 2 under study is lag 7 and lag 6 respectively as can be seen in Table 3 and 4. The results of Block exogeneity granger causality test under VAR approach is represented in table 5 and 6. The results depict significant multivariate causal relationship of selected time series in the study. We have found significant causality running from nifty returns towards MF (buy, sell and net), INSU (buy, sell and net) DFI (buy) and Bank (sell). Bank (buy) is weakly causing Nifty returns (which shows price pressure effect) and no other flow variable is causing stock returns. In magnitude for causal relations nifty return has maximum effect on MF (net) followed by investments of INSU (net). However, none of the flow variables except bank (buy) is causing nifty returns.

The responsiveness of one time series to unexpected shock of other time series can be studied in a VAR environment with help of impulse response function. It helps in investigating the responsiveness of endogenous variables within a VAR system. To check this, a unit shock is injected in the error for every endogenous time series from every equation of the VAR system.

Impulse response function in figure 1 and figure 2 represents the model 1. Figure 1 shows the response of nifty returns to one standard deviation shock in the daily buy and sell values of MF, INSU, DFI and banks. The response of nifty returns to 1 SD shock in selling done by DFI, INSU, MF and Bank is negative. The response of

nifty returns to 1 SD shock in buying done by MF, DFI, INSU is positive for 10 days. The response of nifty returns to shock in buying done by banks is negative. Trading done by MF, INSU, DFI and Banks is impacting stock returns for a short run.

Figure 2 shows the response of buying and selling done by MF, INSU, DFI and banks to one standard deviation shock in nifty returns. Response of MF, DFI, and INSU buying is negative to 1 SD shock in returns. Response of 1 SD shock in nifty reurns on selling done by MF and INSU is positive, which means they move opposite to market and show contrarian trading strategy. Buy and sell values of Banks is negatively reacting to shock in returns which shows that they move with the market showing a positive feedback trading behaviour. Shocks in returns are having a long-lasting impact of 20 to 25 days on the trading of all the four domestic institutional investors. INSU buy showing a sharp increase as against to shock in returns and INSU sell showing a sharp decrease as against to shock in returns which depict them as most active traders.

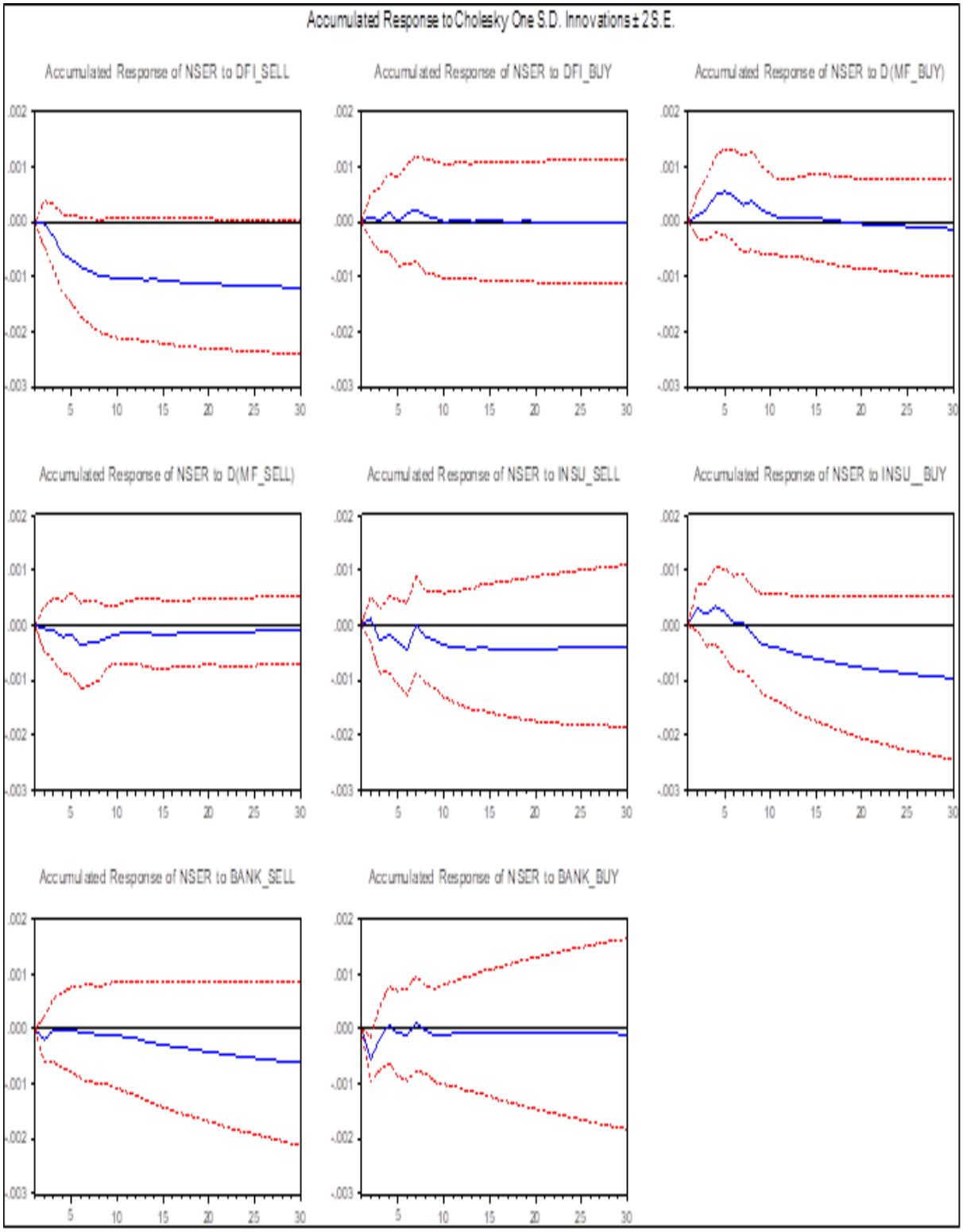
Impulse response function in figure 3 and 4 represents model 2. Figure 3 shows the response of nifty returns to one standard deviation shock in net values of MF, INSU, DFI, and Banks investments. The response of nifty returns is positive to 1SD shock in net investment of four Domestic institutional investors.

Figure 4 shows the response of MF, INSU, DFI and banks to the one standard deviation shock in nifty returns. MF, INSU, and DFI are showing a negative response which confirms their contrarian trading behaviour (value investing or negative feedback trading).

There is a positive response of Banks net investments to one standard deviation shock in nifty returns, so it concludes to momentum trading (positive feedback trading) behaviour. Banks chase the nifty return of Indian stock market which can increase the volatility in the returns of the nifty 50 index. MF, INSU, DFI invest in a falling market which shows that have better micro information about the firms listed in the stock market, so they involve in value investing. Likewise, MF, INSU, DFI know the timing when the share value of the firm is overvalued while the stock markets are moving up, so they sell and provide stability to the market in.

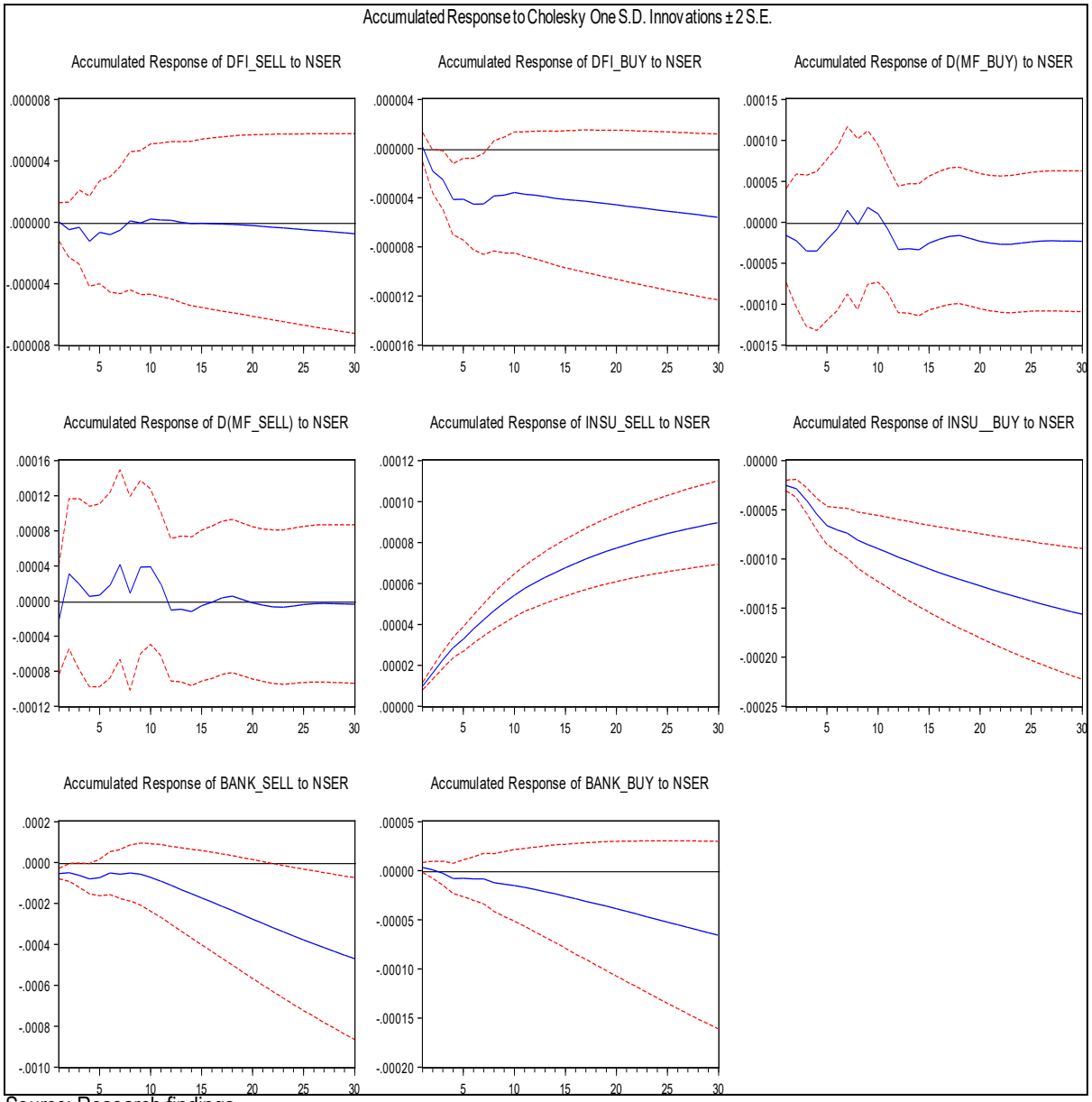
The variance decomposition in VAR provides a different method to examine the dynamics of this system. The table of variance decomposition represents the proportion of variation in the movement of endogenous variables which are due to shock in its ‘own’ lagged values and shocks in lagged values of other variables of the system. Results in Table 7 show that variance in nifty is defined by its ‘own’ lagged values. Buy and sell values of MF, DFI, INSU, and bank are defining return with a small percentage. Out of all of them, Bank Buy is defining the nifty returns of 0.54%, which is the highest. Stock returns are defining INSU buy and sell by 4.12% and 10.015% respectively. Stock returns define Bank buy and sell values by 0.26% and 0.58% respectively. Stock returns are defining DFI buy and sell values by 0.68% and 0.16% respectively. Stock returns define the buy and sell of MF by 0.06% and 0.16% respectively.

Figure 1. (model 1) Impulse Response Function between buy and sell values of mutual funds, Insurance companies, banks, development financial institution equity investments and Nifty Returns. Line in red is 5 percent confidence band



Source: Research findings

Figure 2. (mode1) Impulse Response Function between mutual funds, Insurance companies, banks, development financial institution (Buy and sell) equity investments and Nifty Returns. Line in red is 5 percent confidence band



Source: Research findings

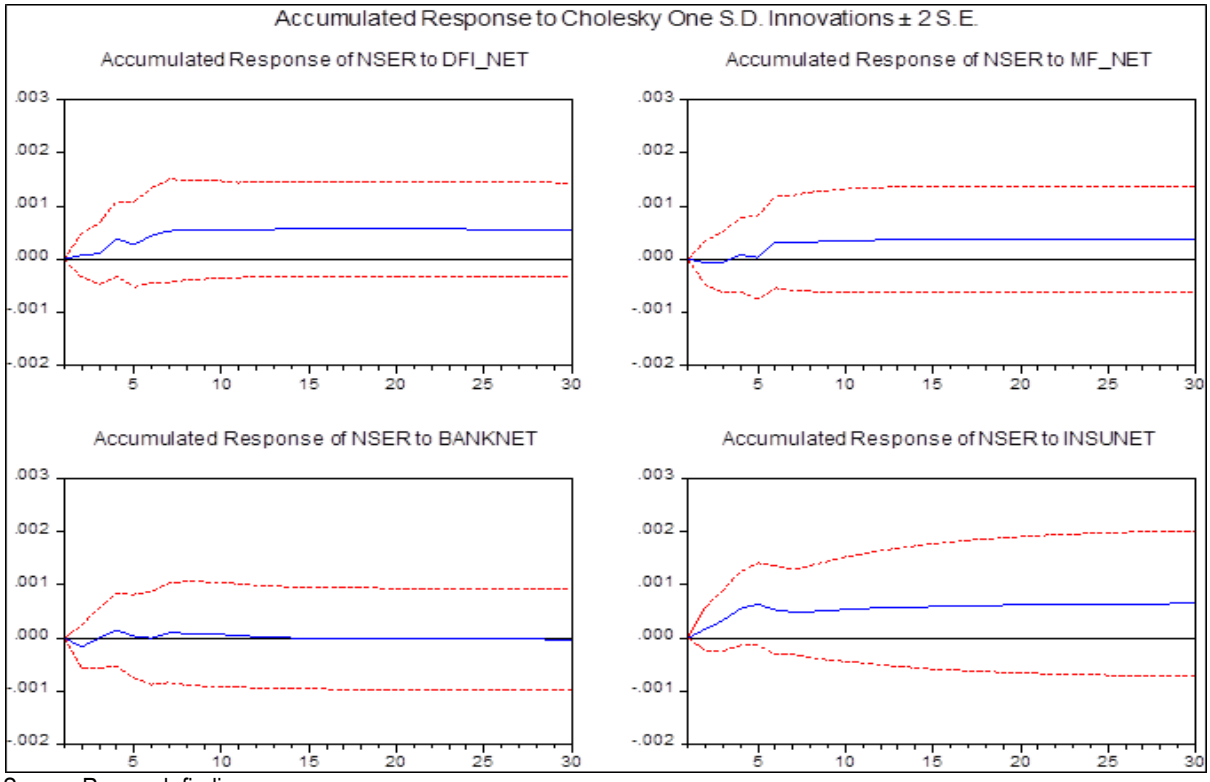
Table 7. Variance Decomposition analysis (model 1)

Variance Decomposition of NSER: By DII								
Period	DFI_SELL	DFI_BUY	D(MF_BUY)	D(MF_SELL)	INSU_SELL	INSU__BUY	BANK_SELL	BANK_BUY
10	0.175	0.1	0.15	0.0723	0.4509	0.2298	0.063	0.548
Variance Decomposition of DII Buying and selling : By NSER								
Period	DFI_SELL	DFI_BUY	D(MF_BUY)	D(MF_SELL)	INSU_SELL	INSU__BUY	BANK_SELL	BANK_BUY
10								
	0.174	0.69	0.07	0.1625	10.314	4.1219	0.612	0.258

Source : Research findings

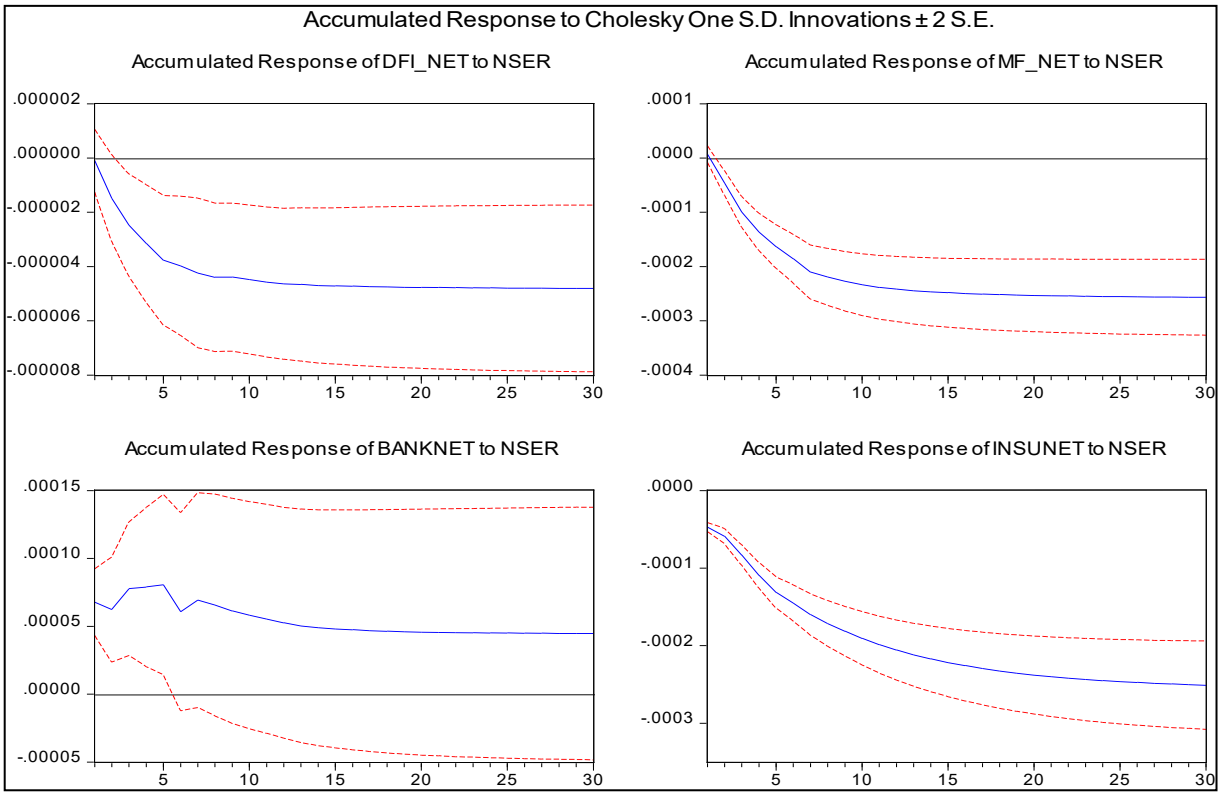
Cholesky Ordering: NSER DFI_SELL DFI_BUY D(MF_BUY) D(MF_SELL) INSU_SELL INSU__BUY BANK_SELL BANK_BUY

Figure 3. (model 2) Impulse Response Function between buy mutual funds, Insurance companies, banks, development financial institution (net) equity investments and Nifty Returns. Line in red is 5 percent confidence band.



Source: Research findings

Figure 4. (model 2) Impulse Response Function between mutual funds, Insurance companies, banks, development financial institution (net) equity investments and Nifty Returns. Line in red is 5 percent confidence band.



Source: Research findings

Table 8. Variance Decomposition analysis (model 2)

Variance Decomposition of NSER: By DII						
Period		NSER	DFI_NET	MF_NET	BANKNET	INSUNET
10		99.57998	0.116802	0.095712	0.091602	0.1159
Variance Decomposition of DII net investment: By NSER						
Period		DFI_NET	MF_NET	BANKNET	INSUNET	
10		0.434037	5.287941	1.238542	14.0704	

Source: Research findings
Cholesky Ordering: NSER DFI_NET MF_NET BANKNET INSUNET

The Table 8 results show variance decomposition between the net values of all four DIIs and the Nifty returns. The nifty returns define the INSU net as a maximum value of 14%, the MF net as 5.27%, the bank net as 1.23%, and the DFI net as 0.43%.

The dynamics of relationship between DII at disintegrate level with nifty returns reveal that there is strong impact of nifty returns on MF, INSU, Bank and DFI trading behaviour. Shock in investments of MF, INSU, Banks and DFI are all impacting nifty returns positively. The impact of stock returns on MF, INSU, DFI and Banks last for a longer time period as compared to their impact on stock returns, this analysis is similar to (Mishra & Debasish, 2017). Purchasing done by these investors is having much influence on nifty returns as compared to selling which can be seen in variance decomposition table, which is similar to Oh & Parwada (2007). Therefore, three DII (MF, INSU, DFI) have negative impact of lagged index returns which means they follow contrarian trading behaviour which makes the results at a disintegrated level similar to Chauhan & Chaklader (2020), Naik & Padhi (2014), Bose (2012), R. H. Acharya (2013) as they represented DII with Mutual funds. The results are also similar to Mishra & Debasish (2017) and Arora (2016) who have taken a consolidated data for DII.

Stock returns have a positive impact on Banks, so they follow a momentum trading behaviour, which is similar to the results of SriLankan markets (Samarakoon, 2009) where DII follow positive feedback trading and in Korean markets where equity trust follow positive feedback trading (Ndei, Muchina, & Waweru, 2019). We can conclude that not all DII's follow contrarian trading behaviour in Indian markets. Lagged values of stock index return highly impact insurance companies and appear to be the most active traders of the markets. Net maximum investments done by MF is highest among all the four DII under study, it can be seen in descriptive statistics. Ganger causality results confirm Unidirectional causality from returns to buy, sell, and net values of MF and INSU. Causality is running from stock returns to DFI buy, only which in sync with results of variance decomposition where returns are least defining DFI's. Stock returns are granger causing Bank Sell, while causality is running from bank buy to stock returns which gives support to the presence of price pressure hypothesis similar to the results of (Ben-Rephael, Kandel, & Wohl, 2010). Many studies confirm that granger causality is running from stock returns to DII (Mishra & Debasish, 2017, Arora, 2016). Stock returns define the trading of INSU the maximum followed by MF, Banks and DFI.

Conclusion

The study investigates about the trading strategies of four domestic institutional investors *i.e.* Mutual funds, insurance companies, development financial institution, and banks in Indian stock markets. The study uses data of DII at disintegrated level with separate buy sell and net values of MF, INSU, DFI and banks. The time duration of data under study is from 2012 to 2022, and CNX nifty 50 Index is used to represent the returns in the Indian stock market. Vector autoregressive model and granger causality block exogeneity test is used for the purpose of the study. The VAR model runs in the presence of three market fundamental variables exchange rate, interest rate and dividend. Rate. There are different categories of investors like aggressive investors, well-informed investors, risk-averse investors who trade in the stock market. Investment behaviour of rational and informed investors provides sentiments to stock returns whereas feedback traders follow them with an expectation of a persisting trend. The results of this study tell that it is the nifty returns that negatively impact the investment behaviour of MF, INSU, DFI, and positively impact the banks. MF, INSU and DFI are involved in contrarian trading strategy (negative feedback trading or value investing) and Banks are involved in positive feedback trading (momentum trading).

Bank is the biggest investor among four DII at net level and trade by chasing the pattern of stock markets, it tends to move the stock prices away from fundamentals which may increase the volatility in stock markets. MF,

INSU, DFI make investments in falling markets because they have better information regarding the firms and tend to buy stocks of good firms in falling markets. They also have better information regarding the timing of overvaluation of stock of the firm, so they sell the stock in rising markets. In both cases they provide stability in stock markets and bring the values of stock near to fundamentals. MF, INSU, DFI and Banks are not only following their past lagged investment pattern but are also following the investment pattern of other institutional investors which may lead to herding behaviour in the market and can be matter of concern during shock periods.

The regulatory authorities should make policies promoting investment through equity mutual funds as savings of small investors may pump in huge amounts of money in stock markets which will result in stabilizing effects to stock markets. Policies regarding investments in equity mutual funds for a larger duration of time will help the fund managers to invest consistently in stock markets.

Regulatory authorities of Insurance companies should increase the ceiling limit of their investment in stock markets so that their investment participation can be increased which will lead to stability in stock markets. An awareness drive to increase the investments into insurance instrument should be done to increase the investment corpus of insurance companies as many people in India still not think insurance as a mandatory part of their investments.

Development financial institutions investments is providing strength to Indian stock markets as they are contrarian traders so regulatory authorities should support DFI for increasing their horizons to invest into the stock markets. Strict Norms should be made by regulatory authorities for banks so that to curb the volatility creation in the market due to positive feedback trading.

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Credit Authorship Contribution Statement

Purwa Srivastava contributed to the study's conceptualization and assisted in designing the research methodology. **Sakshi Varshney** supervised the overall research work, validated the data, and provided critical input throughout the development of the paper. **Taru Maheshwari** worked on selecting appropriate software tools and helped in data analysis. **Neha Singh** and **Divya Rana** were responsible for reviewing, editing, and refining the final draft of the manuscript**.**

Declaration of Competing Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Declaration of Use of Generative AI and AI-assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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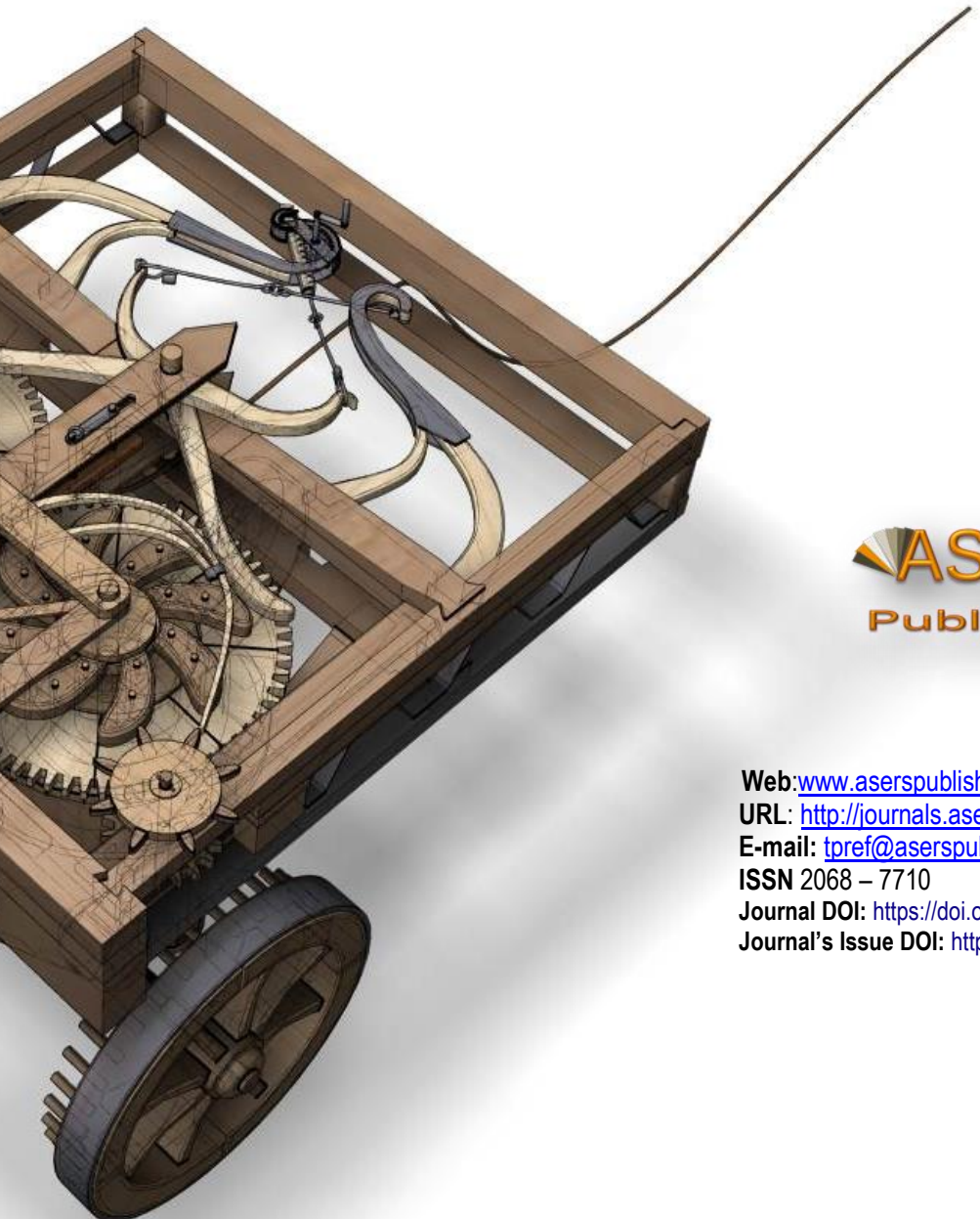

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