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VAR ANALYSIS ON FII'S PORTFOLIO DECISIONS - CAUSE EFFECT ANALYSIS IN INDIAN CONTEXT

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ABSTRACT

Year 1990 has brought a great revolution in Indian Financial Market so called legend year of the history invited foreign investors and welcomed their investment in Indian market. This study is an attempt to identify factors influencing foreign institutional investors to invest in Indian market. In order to achieve this objective, this study has been conducted to identify short term/long term causality relationship running from the independent factors (P/E, P/B, and Dividend yield) to FIIs. This has been explained with the help of unrestricted VAR model and direction of causality is defined by Granger Causality Model. Result shows that above listed factors jointly attract FIIs to invest in Indian companies, but P/B is most prominent factor among all. Daily data frequency from 1st January 2002 to 29th December 2006 has been used.

KEYWORDS: Institutional Investors, Price to Book Ratio (P/B), Price to Earnings Ratio (P/E), Dividend Yield, Unrestricted VAR Model, Granger Causality Test

1. INTRODUCTION

An economy is the combination of several components like labor, capital, financial market, goods, demand, supply, technologies, organizations, and services. A well organized financial market is an important need of economic development. Financial market supplies necessary capital for the production of goods and services to organization, which, in turn, promotes the well being and standard of living of the people. Financial market is divided into two markets; money market and capital market. The Money market deals with short term debt whereas capital market deals with long term debt and equity. Each of these markets has a primary segment and secondary segment.

Since 1990-1991, the Government of India has opened its door for FIIs through liberalization and Globalization. Under this economic reform, FIIs are allowed to make portfolio investment in the Indian Capital Market. Narsimhan committee made this entry possible by making a recommendation of FIIs entry into capital market, though objectives of suggested policy were not elaborated. From September 14, 1992 with suitable restrictions, Foreign Institutional Investors were allowed to invest in all the securities traded on the primary and secondary markets, including shares, debentures, and warrants issued by companies, which were listed or were to be listed on the Stock Exchange in India. The reason behind this economic reform is to make rapid and substantial economic growth, easy access to foreign technology and foreign capital with substantial reduction in industrial licensing requirements, and restriction on investment and expansion.

Now days, a significant portion of Indian corporate sector's securities are held by Foreign Institutional Investors, such as pension funds, mutual funds and insurance companies. These investors are often viewed as sophisticated investors as these institutional investors are better informed and better equipped to process information than individual investors

(Han and Wang, 2004).

FII include "Overseas pension funds, mutual funds, investment trust, Asset Management Company, Nominee Company, bank, institutional portfolio manager, university funds, endowments, foundations, charitable trusts, charitable societies, a trustee or power of attorney holder incorporated or established outside India proposing to make proprietary investments or investments on behalf of a broad-based fund. These client accounts that the FII manages are known as 'sub-accounts'. A domestic portfolio manager can also register itself as an FII to manage the funds of sub-accounts.

The whole study is organized as follows. Next section deals with literature review while the third section outlines the Gap analysis of this study. Section four & five outlines the Empirical Research Methodology findings & Analysis. Finally, Conclusion is made in section six.

2. LITERATURE REVIEW

Being a developing country, India has a great potential to attract foreign institutional investors. Due to growing trend of Indian equity market and liberalization after 1990, foreign Institutional Investors has become the topic of main concern. Equity market behavior is likely depends upon foreign investment. Recent study made by Japan Bank for international operation (JBIC), shows India is going to be a hot spot choice among Japanese Investors in upcoming years. In the literature, it has been found block shareholders always influence the firm performance (Cho, R.K, & Padmanabhan, 2001). Therefore, Governance or Ownership structure of listed companies always plays significant role to influence Foreign Institutional Investors Portfolio investment decisions. At the same time, working conditions and financial performance of a company always is the second priority considered by foreign Institutional Investment decisions. A study based on the impact of foreign Institutional Investment on the performance of emerging market firms, has found that there is positive effect of foreign ownership on firm performance (Douma, S., Rejie, Kabir, & R., 2006). On the corporate governance (Aggarwal, R., Klapper, Wysocki, & P.D., 2005) has written that good corporate governance attracts FIIs. FIIs seeks to secure investment while investing in a company and a company with shareholders who have the ability to divest assets, gives insecure feeling to FIIs. Financial performance comes next which assure secure investment by few performing indicators which reveal hidden company’s secrets. At the end FIIs main objective is to get back handsome profit out of their investment and time value of money always been considered while making investments on the top of that investing capital into highly volatile environment fuel their expectations too. Thus, not only a better corporate governance but better financial performance also preferred by foreign Institutional Investors. (Karimullah, 1997-2007) examined the impact of FII in equity investment behavior in stock market. His study explains two way causal relationship between behavior and performance of Indian Stock market. He also analysed the purchase and sales behavior of FIIs.

(Li, Jeong-Bon, & K.V., 2004) found that foreign investors tend to avoid stocks with high cross-corporate holdings. (Morin, 2000) explored the influence of French model of shareholding and management on FII. The trading behavior of foreign investors was largely influenced by the return in global market so called positive feedback trading (Richards, 2004). This study has been done with six Asian emerging equity markets. (Leuz, C., Nanda, Wysocki, & P.D., 2003) further asserted that information asymmetry cause foreigners to hold fewer assets in firms. It is always advisable to firms that they should contribute with their all level characteristics to contribute to information asymmetry problems and try to provide all level of information required to investors. (Haw, Hu, Hwang, & Wu, 2004) also investigated that firm level factors cause information asymmetry problems to FIIs. Foreign investment in firms provides more capital available to extend business in a better way with better quality with the help of better corporate governance.

The other scenario which reveals that equity return has a significant and positive impact on FIIs in India (Agrawal, 1997), (Chakrabarti, 2001), (Trivedi & Nair, 2003) Most of the existing literature on FIIs in India explained that foreign investors could play a role of market maker and book their profits when the prices are declining and sell when the asset prices are increasing (Gordon & Gupta, 2003). Bi-directional causality relationship explained by (Rai & Bhanumurthy, 2003) between FIIs and the equity returns.

3. GAP ANALYSIS

A growing literature has been found on FIIs functioning, their investment process, investment decisions, and corresponding market behavior but less technical evidences on factors influencing FIIs investment in India and their portfolio decisions. Central objective of this study is to identify financial indicators attract FIIs to invest in Indian firms and lead their portfolio decisions. This is done with the help of another econometric tool known as Unrestricted VAR model along with Granger Causality Test. Later, impulse response and variance decomposition of variables has been used to identify behavior of FIIs due to financial indicators and percentage of contribution made by each financial factor to explain FII's behavior. All econometric models have been applied in Views.

4. EMPIRICAL RESEARCH METHODOLOGY

Empirical research methodology has been designed in order to identify factors influencing FIIs to invest in Indian Market. This section comprises data & variable and Methodology used in this study.

4.1 Data & Variable

Data set of this study has been taken from 1st January 2002 to 31st December 2006. These are Price to Book Ratio on NSE, Price to Equity Ratio on NSE, Dividend Yield on NSE, FII net investment on NSE, All the above daily data sets are collected from secondary data sources; National Stock Exchange and IIFL.

4.2 Methodology

NSE is the basket of fifty large liquid stocks representing leading companies from 19 sectors in India and regarded as the pulse of Indian Stock Market. This methodology contains some econometric models to estimate the following null hypothesis which are:

- Does P/E, P/B, and Dividend Yield jointly causing FIIs in long run
- Does P/E, P/B and Dividend Yield jointly causing FIIs in short run
- Does P/E, P/B and Dividend Yield individually causing FIIs in short run

In order to estimate above hypothesis, a unique econometric model selection procedure has been defined to identify which econometric tool is best fitted in order to predict long term or short term causality relationship.

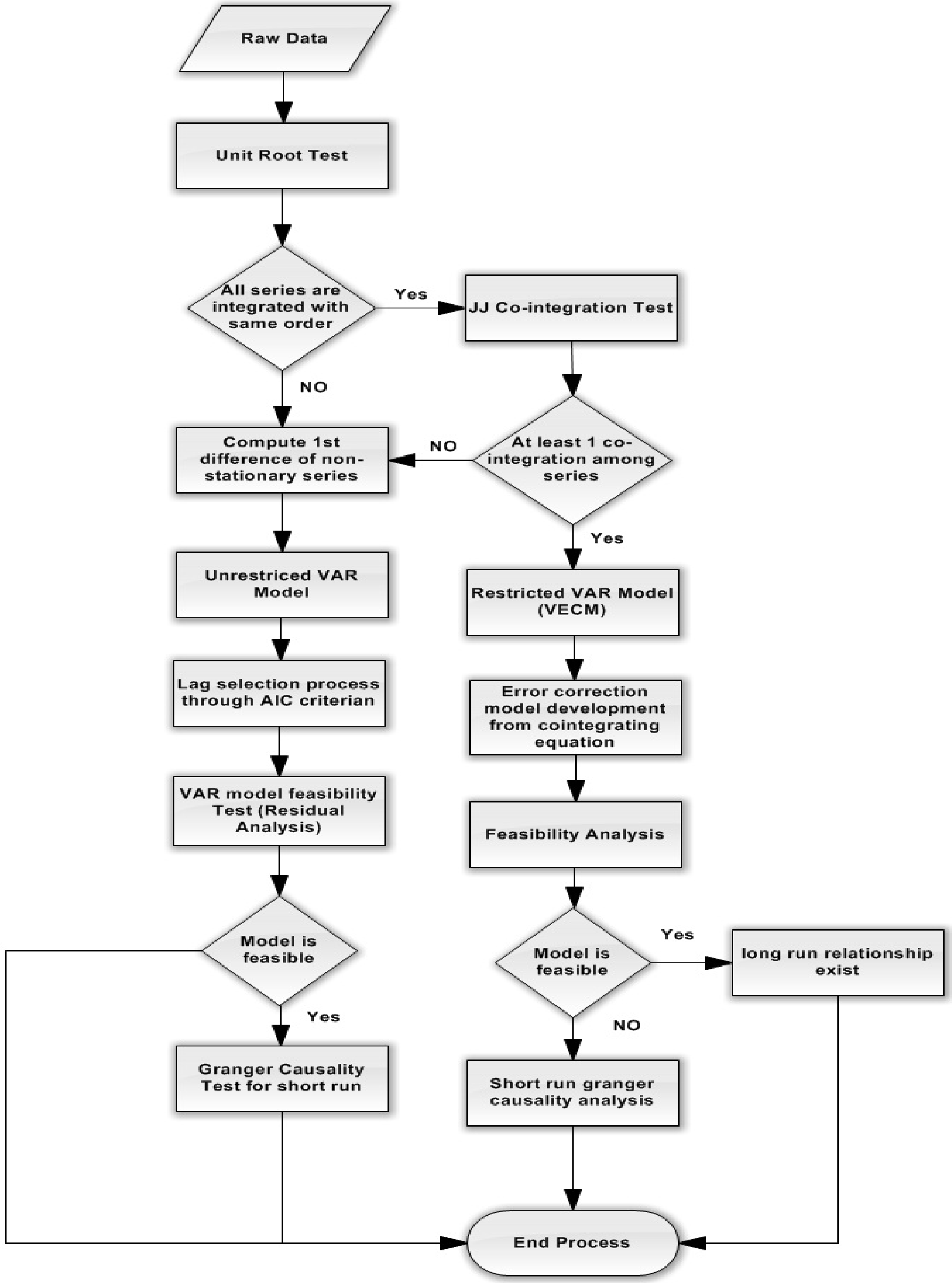

Figure 4.2.a: Model-I

After identification of best econometric tool which is Unrestricted VAR model for this study, second model is constructed and applied upon the collected data sets to identify factors influencing FIIs to invest in Indian Stock Market.

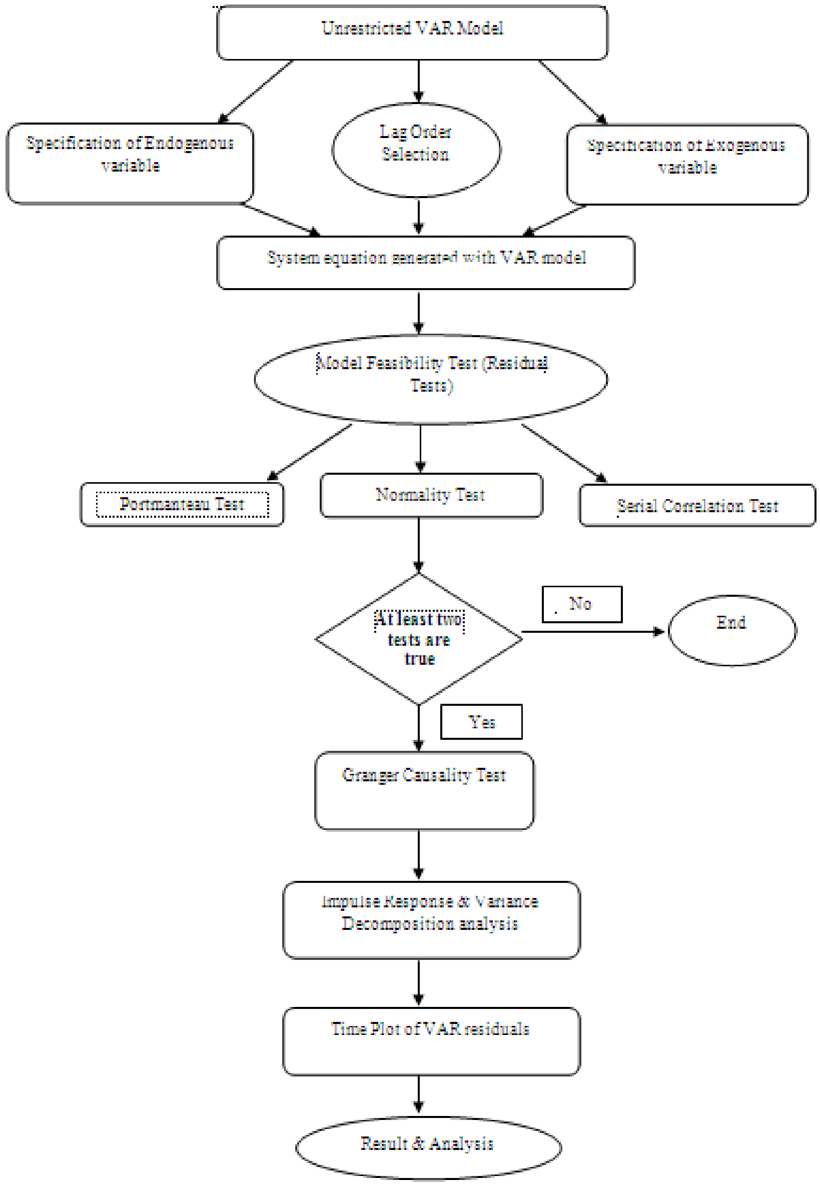

Figure 4.2.b: Model-II

4.3 Unit Root Test

Under this section, study examines stationary properties of data. Mean and variance of the series should be constant through time and auto co-variance of the series is not time varying for each given lag value (Enders, 2004). In stationary time series, shocks will be temporary and over the time their effects will be eliminated as the series revert to their long run mean values. Thus, the key way to test for non-stationary is to test for existence for unit root or the order of integration (I) of variables. The present study employs the Augmented Dickey-Fuller (Dickey & Fuller, 1979), (Dickey & Fuller, 1981) Phillips and Perron (Phillips & Perron, 1988) test for unit root test. If all of the series are non-stationary in levels, it should be stationary in successively differences with the same level of lags. Regression equation of ADF test takes following form:

$$\Delta Y_t = \alpha_0 + \beta T + \gamma Y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta Y_{t-1} + \mu_t \tag{1}$$

The ADF regression test for existence of unit root in Y_t is in the logarithm format for all the variables (PSR, ADR) at time t. The variable ΔY_{t-1} expresses the first differences with p lags and μ_t is the variable that adjusts the error of auto-correlations. α_0, β, γ and θ_i Are the parameters to be estimated? The null and alternative hypothesis for the existence of unit root in variable Y_t is

$$H0: \gamma = 0 \quad H1: \gamma < 0 \tag{2}$$

However, ADF test losses power for sufficiently large values of p. Consequently, an additional, alternative test posited by Phillips and Peron (PP) (1987), which allows weak dependence and heterogeneity in residuals is conducted by following regression equation:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \varepsilon_t \tag{3}$$

Where, ε_t is serially correlated.

PP test is used because it will make a correction to the t-statistics of the coefficient from the AR (1) regression to account for the serial correlation. PP test is a test of the hypothesis $\rho = 1$ in the equation 3. But, unlike ADF test there are no lagged difference terms. Instead, the equation is estimated by OLS and then the t-statistics of the ρ coefficient is corrected for serial correlation in ε_t.

Though ADF and PP test are used in most of the cases but ADF and PP test are known to suffer potentially severe finite sample power and size problem as well ADF and PP tests are known to have low power against the alternative hypothesis that the series is stationary with large auto regressive roots. To circumvent the problem (Kwiatkowski, Phillips, Schmidt, & Shin, 1992) offer stationary (KPSS) test. They derive their test by given model

$$Y_t = \beta' D_t + u_t + u_i \tag{4}$$

$$u_t = u_{t-1} + \epsilon_i \quad \epsilon_t \sim wN(0, \sigma^2_\varepsilon) \tag{5}$$

Where D_t contains deterministic component (constant or constant with trend) u_t is I (0) and may be heteroskedastic. The null hypothesis is tested as

$$H_0: \sigma^2_\varepsilon = 0 \tag{6}$$

Which show Y_t is I (0) and implies u_t is constant. KPSS test is the lag-range multiplier (LM) or score statistics for testing $\sigma^2_\varepsilon = 0$ against alternative $\sigma^2_\varepsilon > 0$ is given by

$$KPSS = (T^{-2} \sum_{t=1}^{T} \hat{S}^2_t) / \hat{\lambda}^2 \tag{7}$$

Where $\hat{S}^2_t = \sum_{j=1}^{t} \hat{u}_j$ $\hat{u}_i$ is the residual of the regression of Y_t on D_t and $\hat{\lambda}^2$ is consistent estimate of the long run variance of u_t using $\hat{u}_t$.

4.4 Unrestricted VAR model

A VAR model describes the evolution of a set of *k* variables (called *endogenous variables*) over the same sample period (*t* = 1... *T*) As a linear function of only their past values. The variables are collected in a $k \times 1$ vector y_t, which has as the i^{th} element, $y_{i,t}$, the time t observation of the i^{th} variable. For example, if the i^{th} variable is GDP, then $y_{i,t}$ is the value of GDP at time t. A *p-th order VAR*, denoted **VAR (*p*)**, is

$$Y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + e_t \quad (8)$$

Where, the l-periods back observation y_{t-l} is called the l-th ***lag*** of y, c is a $k \times 1$ vector of constants (intercepts), A_i is a time-invariant $k \times k$ matrix and e_t is a $k \times 1$ vector of error terms satisfying

A pth-order VAR is also called a **VAR with *p* lags**. The process of choosing the maximum lag p in the VAR model requires special attention because inference is dependent on correctness of the selected lag order (Enders, 2003). Lag value has been decided by lag length selection criteria in VAR model (Hatemi & Hacker, 2009)

4.5 Impulse Response Test

The Impulse response function is a shock to a VAR system. Impulse response identifies the responsiveness of the dependent variables (endogenous variable) in the VAR, when a shock is put to the error term such as U1. A unit shock is applied to each variable, and observes its effects on the VAR system. It is essential tool in empirical causal analysis.

Let Y_t be a k- dimensional vector series generated by

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + U_t \quad (9)$$

$$= \varphi(B) U_t = \sum_{i=0}^{\infty} \varphi_i U_{t-i} \quad (10)$$

$$I - (I - A_1 B - A_2 B - \dots - A_p B^p) \psi(B) \quad (11)$$

Where, cov $(U_t) = \Sigma_i \varphi_i$ is a MA coefficients measuring the impulse response. More specifically, $\varphi_{jk,i}$ represents the response of variable j to a unit impulse or shock or innovation in variable k occurring i-th period ago.

Highlights about IRF (Impulse Response Function)

- Sensitive to variables ordering.
- Omitting important variables may lead to major distortions in IRF and make the empirical results worthless. However, its impact on forecasting could small.

4.6 Variance Decomposition

Variance decomposition decomposes variance in an endogenous variable into the component shocks to the endogenous variables in the VAR. Variance Decomposition involves following equations

$$Y_t = \bar{Y} + \sum_{i=1}^{\infty} \emptyset_{11} \varepsilon_{yt-i} + \sum_{i=1}^{\infty} \emptyset_{12} \varepsilon_{zt-i} \quad (12)$$

$$Z_t = \bar{Z} + \sum_{i=1}^{\infty} \emptyset_{21} \varepsilon_{yt-i} + \sum_{i=1}^{\infty} \emptyset_{22} \varepsilon_{zt-i} \quad (13)$$

4.7 Granger Causality Test

The pioneering work on co-integration analysis was done by (Engle & Granger, 1987) to explore the relationship between the series by using Granger-Causality test. According to the model if two series are co-integrated, then there must be Granger-Causation in at least one direction.

Granger-Causality test involves following equation

$$Y_t = \mu_t + \sum_{i=1}^{p} \alpha_i Y_{i-i} + \sum_{j=1}^{q} \beta_i X_{t-i} + \varepsilon_t \quad (14)$$

According to equation, a variable X_t Granger will cause Y_t, if Y_t can be predicted with better accuracy by using past values of X_t with other factors hold constant. μ_t Known as deterministic component and ε_t is white noise. Meanwhile, the null hypothesis can be tested by using F-test. When the p-value is significant, the null hypothesis of the F-statistic is rejected at 1%, 5% or 10% level of significance, which implies that the first series Granger-causes the second and vice-versa.

5. EMPIRICAL FINDINGS & ANALYSIS

5.1. Unit Root Test

In order to apply econometric model on data sets P/E, P/B, dividend yield, and FIIs net investment, first we need to investigate stationary of data. Three tests ADF, PP, and KPSS with constant have been used and results of data set given in Table 1, 2, 3 are found non-stationary at levels except FII net investment. In other words, all series are not integrated in same order proved that no long run relationship existing among series. FII is stationary at level I (0); whereas other three series P/E, P/B, and dividend yield are non stationary at level but stationary at their first difference I (1). Therefore, according to given data characteristic unrestricted VAR model is best fitted model to predict short run causality relationship among variables, and to identify whether P/E, P/B, and dividend yield jointly influencing FII investment or individually.

5.2 Unrestricted VAR Model

In order to conduct short run causality analysis unrestricted VAR model has been used on FII, P/E, P/B, and dividend yield with suitable lag value decided by lag length criteria given in table 4; result of this criteria explained AIC lag value is most suitable and highly recommended for VAR model. Lag value 4 is best suited according to lag length criteria. Result of unrestricted VAR model is given in table 5, R-square 20.0831% and adjusted R-square 19.0452l. Lesser R-square, it is the result of few independent variables has been used to predict FII in the VAR system. FII investment does not only depend upon the variables, rather ownership structure of the company also plays an important role; which is presently not been used. But at the same time p-value of F-statistics is significant which implies that all specified independent variables are able to predict the behavior of FII. Further residual tests have been conducted before the application of Granger-Causality to check the feasibility of VAR model. These feasibility tests are:

- Residual Portmanteau Tests for Autocorrelations:
- Residual Serial Correlation LM Tests
- VAR Residual Normality Tests

Residual Portmanteau Test for Autocorrelations is used to identify autocorrelation in error terms or residuals. According to result given in table 6; there is no autocorrelation with the selected lag value 12. All the p-values from lag 1 to lag 12 are greater than 5% and null hypothesis that no residual autocorrelation up to lag 12 has been accepted.

Residual Serial Correlation LM Test is used to identify serial correlation among individual error terms or residual. According to result given in table 7; no serial correlation has been found and null hypothesis that no serial correlation up to lag 12, has been accepted at 5% level of significance.

VAR Residual Normality Test given in table 8; residuals are not multivariate normal, and null hypothesis that residuals are multivariate normal, has been rejected at 5% level of significance. According to econometrics model feasibility test, this VAR model is feasible because residuals are neither auto-correlated nor serially correlated though residuals are not normally distributed as well.

5.3 Impulse Response Test

It is used to find the impact of one serious on other, composition of two serious in the near future, and behavioral impact of one series on the other series when one standard deviation shock or innovation or impulse is given to any one the variables.

Impulse to Dividend Yield: It has been shown in Graph 1, which explains the Impulse response analysis between FII net investment and Dividend yield, that if one standard deviation shock or innovation or impulse is given to dividend yield then corresponding behaviour of FII series. FII behaves negatively and gradually move towards zero. 10 periods has been taken which represents month for this analysis. In the month of 2nd FII series touches high negative value and as we move towards future it gradually moves towards zero. This impulse response puts a condition on series. According this condition a stationary series has to move towards zero in future.

Impulse to Price to Book: According to Graph 2, when one standard deviation shock is given to price to book, FII net investment changes to positive. In the 2nd month, it touches highest positive value followed by decay but once again series shows rise in the 5th month followed by decay to zero. FII net investment series has no negative change while giving one standard deviation shock to P/B.

Impulse given to Price to Equity: According to Graph 3, it has been found, when one standard deviation shock is given to price to equity (P/E) then FII net investment series shows positive behaviour with small deviation towards negative side. Highly positive fluctuation has been recorded which culminated in asymptote.

In the nut shell, P/B and P/E responsible for positive behaviour of FII, where as negative behaviour of FII has been found when one standard deviation innovation given to dividend yield.

5.4 Variance Decomposition

According to variance decomposition test given in table 9, it has been found variation in FII is due to four components which are Dividend yield, P/B, and P/E and FIIs behavior itself. Total 10 periods (months) are taken to conduct this analysis. In the beginning 100% variance in FII is due to its own component but as we move towards higher period other components start contributing in FII variation. Which simply means, in the future, changes in FIIs are made due to dividend yield, P/B, and P/E and among these three variables, variance decomposition factor of P/B is higher than remaining two. According to results, It has been concluded that while making portfolio decision P/B attracts FIIs attention first then DY and then P/E.

5.5 *Granger Causality Test*

Granger Causality Test results of second data set (P/E, P/B, Dividend Yield, and FII ne investment)- According to the results given in table 10; it has been found except Price to Book ratio none of the other variables are individually causing FII in the short run, rather all three variables P/E, P/B, and dividend yield jointly causing FII in the short run and corresponding null hypothesis (P/E, P/B, and dividend yield jointly do not granger cause FII) has been rejected at 5% level of significance. Therefore, it has been concluded, no individual short run causality running from independent variables to dependent variable, rather all independent variables jointly causing FIIs in the short run and unidirectional short run causality has been observed. Therefore, all three variables are significantly important to take attention of FIIs to invest in Indian market. Highly positive behavior of FIIs recorded due to P/B and P/E whereas while making portfolio decision FIIs give first preference to higher P/B companies among all.

6. CONCLUSIONS

This study is an attempt to high light major factors causing FIIs portfolio decisions to invest in Indian market. In order to persuade this study three factors have been chosen: P/E, P/B, and Dividend Yield. These all three are the main indicator of financial performance of any company. Results are able to explain that portfolio decision made by FIIs depends upon the performance of these three indicators. FIIs prefer to invest in those companies having these indicators together in good performing condition and the weight age of these three factors is 20% in portfolio decision, but among all P/B has higher decomposition component. Therefore, FIIs make their portfolio of those companies contains all three indicators with higher P/B ratio. It has been also explained that there is a short term causality running from independent variables to dependent variables and direction of causality is unidirectional. FIIs are short term investors and highly sensitive towards market fluctuations. Small fluctuations in independent variables may lead to withdrawal of capital from the market and this also triggers their next portfolio decision. Apart from these chosen indicators corporate governance and company ownership structure also plays an important role to make portfolio to invest.

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APPENDICES

MODEL-II.B

Unit Root Test

Table 1: ADF (H0: Variable has a Unit Root)

Variables	Constant			Trend		
	Level	1st Diff	Conclusion	Level	1st Diff	Conclusion
FII net investment	-11.01794*	Null	I(0)	-11.25964*	Null	I(0)
P/E	-1.483866	-34.66151*	I(1)	-1.820945	-34.66203*	I(1)
P/B	-0.942793	-35.73494*	I(1)	-2.631623	-35.72801*	I(1)
Div Yield	-1.637844	-35.56961*	I(1)	-2.242456	-35.58753*	I(1)

Table 2: PP (H0: Variable Has a Unit Root)

Variables	Constant			Trend		
	Level	1st Diff	Conclusion	Level	1st Diff	Conclusion
FII net investment	-29.26126*	Null	I(0)	-28.97358*	Null	I(0)
P/E	-1.471398	-34.65415*	I(1)	-1.809224	-34.65471*	I(1)
P/B	-0.901864	-35.74695*	I(1)	-2.642808	-35.75256*	I(1)
Div Yield	-1.637844	-35.60884*	I(1)	-2.242456	-35.62913*	I(1)

Table 3: KPSS (H0: Variable is Stationary)

Variables	Constant			Trend		
	Level	1st Diff	Conclusion	Level	1st Diff	Conclusion
FII net investment	0.657885	Null	I(0)	0.109262	Null	I(0)
P/E	0.743014*	0.107976	I(1)	0.291809*	0.053199	I(1)
P/B	3.360583*	0.060286	I(1)	0.280391*	0.031713	I(1)
Div Yield	1.118315*	0.172803	I(1)	0.366258*	0.052512	I(1)

Note: 1) For ADF, PP, * denotes rejection of unit root test hypothesis based on Mackinnon (1991) critical values at 1% level of significance.

2) For KPSS, * denotes acceptance of null hypothesis based on Kwiatkowski et al. (1992) critical values at 1%.

Table 4: Lag Length Criteria

Endogenous Variables: FII D (P/E) D (P/B) D (DY)

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-4657.32	NA	0.021509	7.512203	7.528718	7.518414
1	-4552.97	207.8638	0.018654	7.369815	7.452388*	7.400868*
2	-4525.26	55.02038	0.018305	7.350941	7.499573	7.406836
3	-4499.37	51.23263	0.018016*	7.335006*	7.549697	7.415744
4	-4487.79	22.85434	0.018145	7.34212	7.622869	7.447701
5	-4481.47	12.41551	0.01843	7.357729	7.704537	7.488152
6	-4477.34	8.103561	0.018786	7.37685	7.789717	7.532116
7	-4467.11	19.96983	0.018962	7.386159	7.865084	7.566268
8	-4455.08	23.43082	0.019084	7.392549	7.937532	7.597499
9	-4441.41	26.51250*	0.019156	7.396314	8.007356	7.626107
10	-4436.3	9.892867	0.019496	7.413856	8.090957	7.668491
11	-4429.55	13.01563	0.019789	7.428759	8.171918	7.708237
12	-4419.24	19.79506	0.019972	7.437938	8.247156	7.742258

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 5: Unrestricted VAR Model

FII = C(1)*FII(-1) + C(2)*FII(-2) + C(3)*FII(-3) + C(4)*FII(-4) + C(5)*D(P/E)(-1) + C(6)*D(P/E)(-2) + C(7)*D(P/E)(-3) + C(8)*D(P/E)(-4) + C(9)*D(P/B)(-1) + C(10)*D(P/B)(-2) + C(11)*D(P/B)(-3) + C(12)*D(P/B)(-4) + C(13)*D(DY)(-1) + C(14)*D(DY)(-2) + C(15)*D(DY)(-3) + C(16)*D(DY)(-4) + C(17)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.219675	0.029204	7.522138	0
C(2)	0.106211	0.029647	3.582511	0.0004
C(3)	0.140559	0.029626	4.744406	0
C(4)	0.081532	0.028737	2.837193	0.0046
C(5)	81.57498	46.85181	1.741128	0.0819
C(6)	3.235485	46.92988	0.068943	0.945
C(7)	45.80064	46.88853	0.976798	0.3289
C(8)	-38.26138	46.88355	-0.816094	0.4146
C(9)	510.9406	232.6079	2.196574	0.0282
C(10)	5.746646	233.5462	0.024606	0.9804
C(11)	-6.259138	233.2774	-0.026831	0.9786
C(12)	415.986	231.5079	1.796855	0.0726
C(13)	286.8259	272.4044	1.052942	0.2926
C(14)	-123.8884	272.4092	-0.454788	0.6493
C(15)	-168.1294	273.0299	-0.615791	0.5381
C(16)	214.1257	272.7208	0.785146	0.4325
C(17)	54.05897	10.34788	5.224159	0
R-squared	0.200831	Mean dependent var		125.3778
Adjusted R-squared	0.190452	S.D. dependent var		359.6518
S.E. of regression	323.5963	Akaike info criterion		14.41039
Sum squared resid	1.29E+08	Schwarz criterion		14.48021
Log likelihood	-8982.287	Hannan-Quinn criter.		14.43664
F-statistic	19.35007	Durbin-Watson stat		2.006569
Prob(F-statistic)	0	*significant		

Note: probability of F-stats is significant which reveals that all independent variables can predict dependent variable

Table 6: VAR Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: No Residual Autocorrelations up to lag h

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	0.064861	NA*	0.0649	NA*	NA*
2	0.330929	NA*	0.3314	NA*	NA*
3	0.77276	NA*	0.7743	NA*	NA*
4	2.248276	NA*	2.2546	NA*	NA*
5	12.97551	0.6745	13.025	0.6709	16
6	18.4197	0.9736	18.495	0.9727	32
7	46.35804	0.5403	46.591	0.5307	48
8	64.88249	0.4457	65.235	0.4335	64
9	88.49883	0.2414	89.023	0.2295	80
10	101.59	0.3286	102.22	0.313	96
11	112.5129	0.4686	113.24	0.4495	112
12	130.4073	0.4242	131.31	0.4026	128

*The test is valid only for lags larger than the VAR lag order.

df is degrees of freedom for (approximate) chi-square distribution

Table 7: VAR Residual Serial Correlation LM Tests

Null Hypothesis: no serial correlation at lag order h

Lags	LM-Stat	Prob
1	12.0122	0.7431
2	13.13326	0.663
3	10.35138	0.8476
4	13.5677	0.6309
5	11.16723	0.799
6	5.526214	0.9925
7	29.32963	0.0218
8	19.14642	0.2611
9	23.60955	0.0984
10	13.27946	0.6522
11	11.04541	0.8067
12	18.08463	0.319

Probability from chi-square with 16 df.

Table 8: VAR Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Component	Skewness	Chi-sq	df	Prob.
1	0.908374	171.7674	1	0
2	4.170436	3620.546	1	0
3	-1.129433	265.5415	1	0
4	-1.960255	799.9016	1	0
Joint		4857.757	4	0
Component	Kurtosis	Chi-sq	df	Prob.
1	27.86531	32176.52	1	0
2	61.56762	178511.5	1	0
3	33.7618	49246.41	1	0
4	62.60685	184902.8	1	0
Joint		444837.3	4	0
Component	Jarque-Bera	df	Prob.	
1	32348.28	2	0	
2	182132.1	2	0	
3	49511.95	2	0	
4	185702.7	2	0	
Joint	449695	8	0	

Table 9: Variance Decomposition of FII Net Investment

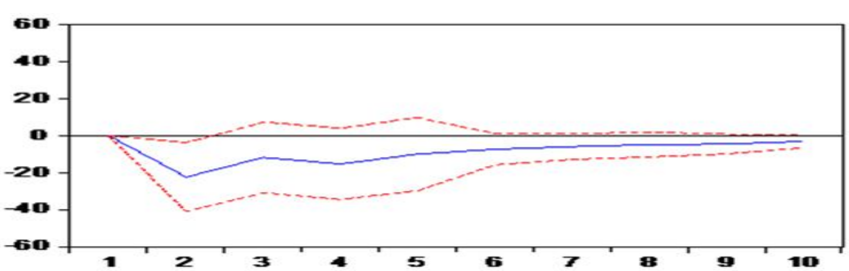
Period(day)	S.E.	FII_NET_INVESTMENT__CR_	DDIV_YIELD	DP_B	DP_E
1	323.5963	100	0	0	0
2	336.502	98.32477	0.439516	1.008402	0.227308
3	341.0709	98.18753	0.547155	1.037762	0.227552

4	348.971	97.91447	0.714051	1.064676	0.306805
5	355.5395	97.49232	0.765748	1.432262	0.309666
6	357.8163	97.3829	0.797951	1.50937	0.309775
7	359.2343	97.3354	0.818327	1.537351	0.30892
8	360.3357	97.28978	0.83094	1.571558	0.307726
9	361.0428	97.24991	0.842799	1.600768	0.306522
10	361.4235	97.23349	0.847997	1.612496	0.306022

Table 10: Granger Causality Test

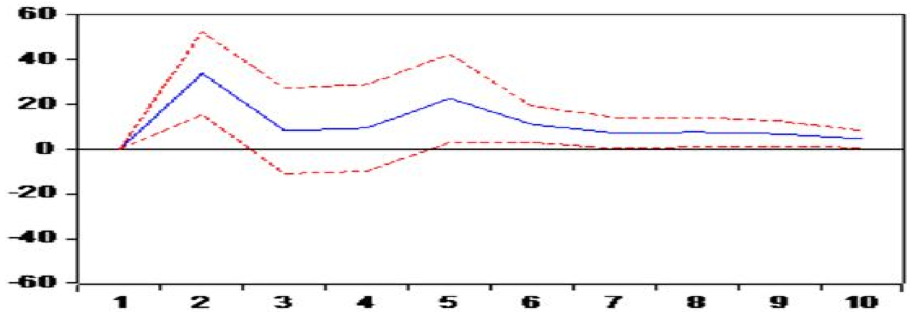
Dependent variable: FII			
Excluded	**Chi-sq**	**df**	**Prob.**
D(DY)	2.428459	4	0.6575
D(P/B)	8.144041	4	**0.0864** **
D(P/E)	4.766679	4	0.3121
All	28.45258	12	**0.0047** *
Dependent variable: D(DY)			
Excluded	Chi-sq	df	Prob.
FII	1.633042	4	0.8028
D(P/B)	2.93992	4	0.5679
D(P/E)	3.107075	4	0.5401
All	9.753341	12	0.6376
Dependent variable: D(P/B)			
Excluded	Chi-sq	df	Prob.
FII	3.943916	4	0.4136
D(DY)	5.245794	4	0.263
D(P/E)	3.511265	4	0.4762
All	13.00537	12	0.3687
Dependent variable: D(P/E)			
Excluded	Chi-sq	df	Prob.
FII	5.50898	4	0.2389
D(DY)	5.420548	4	0.2468
D(P/B)	4.479401	4	0.345
All	18.03696	12	0.1146

Note 1) D (Variable) represents variable in first difference.
2) *Significant at 5% level of significance
3) ** Significant at 10% level of significant
Response to Cholesky One Standard Deviation Innovation (-2SE to +2SE)



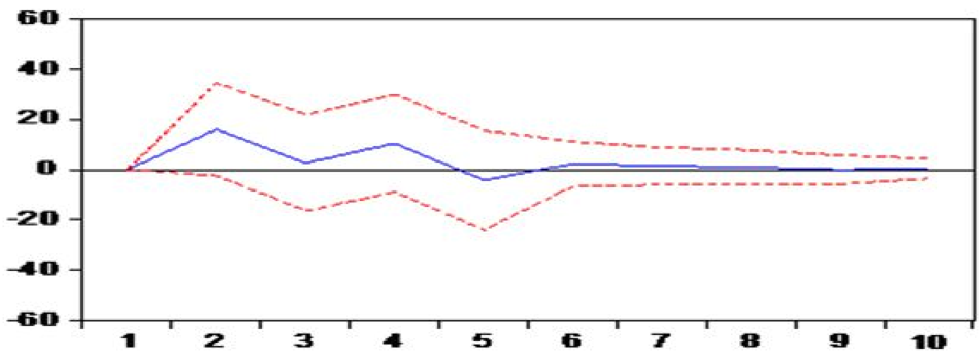
Graph 1: Response to FII net Investment to Dividend Yield

Response to Cholesky One Standard Deviation Innovation (-2SE to +2SE)



Graph 2: Response to FII Net Investment to P/B

Response to Cholesky One Standard Deviation Innovation (-2SE to +2SE)



Graph 3: Response to FII Net Investment to P/E