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Research Article

A Study on Empirical Analysis of Relationship between FPI and NIFTY Returns

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I N T R O D U C T I O N

The term FPI was defined to align the nomenclature of categorizing investments of foreign investors in line with international practice. FPI stands for those investors who hold a short- term view on the company, in contrast to Foreign Direct Investors (FDI). FPIs generally participate through the stock markets and gets in and out of a particular stock at much faster frequencies. Short term view is associated often with lower stake in companies. Hence, globally FPIs are defined as those who hold less than 10% in a company. In India, the hitherto existing closest possible definition to an FPI was Foreign Institutional Investor.

Keywords: Investing Pattern, Stock Market, Foreign Portfolio Investors, Liberal Government, Designated Depository Participants

Introduction

The study is an attempt to evaluate and analyse the relationship between Foreign Portfolio Investors (FPI) and the Indian stock market returns. With the stable economy, better growth prospects, liberal government policies and many more profitable opportunities. India has become a hot destination for FPI investments. Thus, there is a need to study the impact of these investments on the market returns. Daily data of foreign net investment and Nifty returns, for the period starting from January 2016 to June 2017, has been used for evaluating the presence of feedback trading among the foreign investors. Vector autoregression and Granger causality have been used to test the presence of feedback trading hypothesis and establish the cause and effect relationship among the variables. The results suggest that FPIs are influenced by the Nifty returns but the opposite relationship does not hold. As the frequency of the data is changed to monthly, the feedback trading hypothesis does not hold true.

The study of the behaviour and investing pattern of Foreign Portfolio Investors (FPI's) has gained much momentum in the past few decades. The main reason for this surge can be attributed to the growth in the emerging markets which made them an attractive destination for foreign investments. These emerging markets are dependent heavily on foreign investment and thus researchers all over the world are trying to examine the impact of these foreign investments on the developing as well as developed economies.

FPIs play an important role in stock market even though their volume of trade is not much high in comparison to the individual investors or market participants. FPIs are perceived to be information efficient participants and also their assessment about the market movement is considered infallible. Hence, they can be considered as the driving force in determination of market sentiments and price trends prevalent in the Indian market. They only do delivery- based traders, that is why their emergence has been a debatable issue among researchers. Foreign institutional investors main objective is to diversify the investments in internationally via various strategic business units. This diversification helps them in exploiting the

lucrative opportunities in other internationally markers as well as hedge the risk involved therein.

Worldwide there has been mixed views on the investments from the foreign institutional investors as it has both benefits and uneasiness attached. To second these views, it is often said that FPI flows are like hot money and more volatile as compared to other form of investment. Moreover, if the investor base is unrestricted, then there are more expected returns in the market as compared to then the base of restricted investors. With this foreign entry, the investor base has broadened, increasing the diversification and risk-sharing opportunities (Merton, 1987; and Clark and Berko, 1997).

As FPIs have more information about the market so even at the slightest hint of trouble in the host country, they pull back their investments. With these sudden large and concentrated withdrawals, there were instances when the economy faced disastrous consequences. However, there are some economists who have different opinion on these foreign investments. They argue that with the advent of FPIs, markets have become more efficient, transparency of the transactions and dealings has increased, better governance practices have been followed and markets have become more liquid (Banaji, 2000).

Objectives

- The main objective of the study is to analyze the impact of Nifty returns on the FPI inflows and vice versa
- The first objective is to explore the extent to which Nifty returns influence the FPI inflows in India and the existence of a vice-versa relationship
- The second objective is to analyze the impact of lagged Nifty returns and FPI inflows along with testing the presence of feedback trading hypothesis in both daily and monthly data

Methodology

Data is collected from the secondary sources this data is covered monthly period of Four years From January 2016 to January 2019. Data is collected from different official Websites, Books, Magazines. The Data collected is tabulated analyse and interpreted in the using statistical tools like, Average return, Risk, Consistency, Growth.

Tools of Data Collection and Analysis

The tool is used in this study is secondary data and in this website articles, annual and monthly reports of FII DII and Nifty in past two years of data is taken for analysis in this area.

Period of Study

Study is about the Empirical analysis of Relationship between FPI and Nifty returns it is the period of the study is to three months of time.

Origin of FPI, Nifty

Introduction

The term FPI was defined to align the nomenclature of categorizing investments of foreign investors in line with international practice. FPI stands for those investors who hold a short- term view on the company, in contrast to Foreign Direct Investors (FDI). FPIs generally participate through the stock markets and gets in and out of a particular stock at much faster frequencies. Short term view is associated often with lower stake in companies. Hence, globally FPIs are defined as those who hold less than 10% in a company. In India, the hitherto existing closest possible definition to an FPI was Foreign Institutional Investor.

In the Union Budget 2013-14, announced on 28 February 2013, vide para 95, Honourable Finance Minister announced his intention to go by the internationally accepted definition for foreign investors.

Prior to this, in December 2012, SEBI had constituted a "Committee on Rationalization of Investment Routes and Monitoring of Foreign Portfolio Investments" under the chairmanship of Shri K. M. Chandrasekhar with a view to rationalize/ harmonize various foreign portfolio investment routes and to establish a unified, simple regulatory framework. The Committee had submitted its report in June, 2013 to the Government of India.

Based on the committee report, on 7th January, 2014 the FPI Regulations, 2014 were notified in the Gazette of India.

The new FPI Regime came into effect from 1st June, 2014. The FAQs on FPI Regulations can be seen here.

Features of FPI

- Portfolio Investment by any single investor or investor group cannot exceed 10% of the equity of an Indian company, beyond which it will now be treated as FDI
- FIIs, Sub-accounts and QFIs are merged together to form the new investor class, namely Foreign Portfolio Investors, with an aggregate investment limit of 24% which can be raised by the Company up to the applicable sectoral cap
- All existing FIIs and Sub Accounts can continue to buy, sell or otherwise deal in securities under the FPI regime.
- All existing Qualified Foreign Investors (QFIs) may continue to buy, sell or otherwise deal in securities only till the period of one year from the date of notification of the FPI Regulation. In the meantime, they have to obtain FPI registration
- Non-Resident Indians (NRIs) and Foreign Venture Capital Investors (FVCI) are excluded from the purview of this definition
- Designated Depository Participants (DDPs) authorized

by SEBI (as per prescribed norms) would henceforth register FPIs on behalf of SEBI subject to fulfilment of KYC (Know Your Customer) and due diligence norms. DDPs carry out necessary due diligence and obtain appropriate declarations and undertakings before registering an entity as FPI. The DDPs are either Authorized Dealer Category 1 bank authorized by Reserve Bank of India, or Depository Participant or a Custodian of Securities registered with SEBI. Existing SEBI approved Qualified Depository Participant who were registering the QFIs, but not meeting the DDP eligibility criteria, can operate as DDP only for a period of one year

Categories of FPI

As part of Risk based approach towards customer identity verification (KYC), FPIs have been categorized into three major categories.

Category I (Low Risk): Which would include Government and entities like Foreign Central banks, Sovereign wealth Funds, Multilateral Organizations etc.

Category II (Moderate Risk): Which would include Regulated entities such as banks, Pension Funds, Insurance Companies, Mutual Funds, Investment Trusts, Asset Management Companies, University related endowments (already registered with SEBI).

Category III (High Risk): Which would include all other FPIs not eligible to be included in the above two categories.

FPI Investment Restrictions

FPIs are not allowed to invest in unlisted shares. However, all existing investments made by the FIIs/ Sub-accounts/ QFIs are grandfathered. In respect of those securities, where FPIs are not allowed to invest no fresh purchase shall be allowed as FPI. They can only sell their existing investments in such securities.

However, an exception has been made by permitting them to invest in unlisted non- convertible debentures/bonds issued by an Indian company in the infrastructure sector, where 'infrastructure' is defined in terms of the extant External Commercial Borrowings (ECB) guidelines:

FPIs are permitted to invest in Government Securities with a minimum residual maturity of one year. However, FPIs have been prohibited from investing in T-Bills.

FPI can invest in privately placed bonds if it is listed within 15 days. The same debt allocation mechanism that is in place for FIIs/QFIs will be followed for FPIs. The debt investment limits as in June 2014 are as follows:

Table 1

S. No.	Type of Instrument	Cap (USD bn)	Cap (INR Crore)	Remarks
1	Government Debt	20	99,546	Available on demand. Eligible investors may invest only in dated securities of residual maturity of one year and above, and existing investment in Treasury Bills will be allowed to taper off on maturity/sale
2	Government Debt	10	54,023	Available on demand for FIIs registered with SEBI as Sovereign Wealth Funds, Multilateral Agencies, Endowment funds, Insurance Funds, Pension Funds and Foreign Central Banks. Eligible investors may invest only in dated securities of residual maturity of one year and above
3	Corporate Debt	51	2,44,323	Available on demand. Eligible investors may invest in Commercial Papers only up to US$ 2 billion within the limit of US$ 51 billion
	Total	81	3,97,892	

Table 2

Company Name	Symbol	Sector
Cipla	CIPLA.NS	Pharmaceuticals
Coal India	COALINDIA.NS	Energy & Mining
Dr. Reddy's Laboratories	DRREDDY.NS	Pharmaceuticals
Eicher Motors	EICHERMOT.NS	Automobile

Gail	GAIL.NS	Energy- Oil & Gas
Grasim Industries	GRASIM.NS	Cement
HCL Technologies	HCLTECH.NS	InformationTechnology
HDFC	HDFC.NS	Financial Services
HDFC Bank	HDFCBANK.NS	Banking
Hero MotoCorp	HEROMOTOCO.NS	Automobile
Hindalco Industries	HINDALCO.NS	Metals
Hindustan Unilever	HINDUNILVR.NS	Consumer Goods
ICICI Bank	ICICIBANK.NS	Banking
IndusInd Bank	INDUSINDBK.NS	Banking
Adani Ports	ADANIPORTS.NS	Infrastructure
Asian Paints	ASIANPAINT.NS	Consumer Goods
Axis Bank	AXISBANK.NS	Banking
Bajaj Auto	BAJAJ-AUTO.NS	Automobile
Bajaj Finance	BAJFINANCE.NS	Financial Services
Bajaj Finserv	BAJAJFINSV.NS	Financial Services
Bharti Airtel	BHARTIARTL.NS	Telecommunication
Bharti Infratel	INFRATEL.NS	Telecommunication
BPCL	BPCL.NS	Energy - Oil & Gas
Britannia Industries	BRITANNIA.NS	Consumer Goods
Company Name	Symbol	Sector
Cipla	CIPLA.NS	Pharmaceuticals
Coal India	COALINDIA.NS	Energy & Mining
Dr. Reddy's Laboratories	DRREDDY.NS	Pharmaceuticals
Eicher Motors	EICHERMOT.NS	Automobile
Gail	GAIL.NS	Energy - Oil & Gas
Grasim Industries	GRASIM.NS	Cement
HCL Technologies	HCLTECH.NS	Information Technology
HDFC	HDFC.NS	Financial Services
HDFC Bank	HDFCBANK.NS	Banking
Hero MotoCorp	HEROMOTOCO.NS	Automobile
Hindalco Industries	HINDALCO.NS	Metals
Hindustan Unilever	HINDUNILVR.NS	Consumer Goods
ICICI Bank	ICICIBANK.NS	Banking
IndusInd Bank	INDUSINDBK.NS	Banking
Infosys	INFY.NS	Information Technology

FPIs belonging to Category III will not be allowed to issue Offshore Derivative Instruments (ODIs) and/or Participatory Notes (PNs). However, issuers of ODIs and/or PNs shall directly report to SEBI.

NIFTY

The NIFTY 50 index is National Stock Exchange of India's benchmark broad based stock market index for the Indian equity market. NIFTY 50 stands for National Index Fifty and represents the weighted average of 50 Indian company stocks in 17 sectors. It is one of the two main stock indices used in India, the other being the BSE Sensex.

Nifty is owned and managed by India Index Services and

Products (IISL), which is a wholly owned subsidiary of the NSE Strategic Investment Corporation Limited. IISL had a marketing and licensing agreement with Standard & Poor's for co-branding equity indices until 2013. The Nifty 50 was launched 1 April 1996 and is one of the many stock indices of Nifty.

NIFTY 50 Index has shaped up as a largest single financial product in India, with an ecosystem comprising: exchange-traded funds (onshore and offshore), exchange-traded options at the NSE in India and futures and options abroad at the SGX. NIFTY 50 is the world's most actively traded contract. WFE, IOMA and FIA surveys endorse NSE's leadership position.

The NIFTY 50 covers 13 sectors (as of 31 October 2019) of the Indian economy and offers investment managers exposure to the Indian market in one portfolio. During 2008–12, NIFTY 50 Index share of NSE market capitalisation fell from 65% to 29% due to the rise of sectoral indices like NIFTY Bank, NIFTY IT, NIFTY Pharma, NIFTY SERV SECTOR, NIFTY Next 50, etc. The NIFTY 50 Index gives weightage of 39.47% to financial services, 15.31% to Energy, 13.01% to IT, 12.38% to Consumer Goods, 6.11 to Automobile and nil to agricultural sector.

The NIFTY 50 index is a free float market capitalisation weighted index. The index was initially calculated on full market capitalisation methodology. From 26 June 2009, the computation was changed to a free-float methodology. The base period for the CNX Nifty index is 3 November 1995, which marked the completion of one year of operations of National Stock Exchange Equity Market Segment. The base value of the index has been set at 1000 and a base capital of Rs 2.06 trillion. In February 2019, Britannia Industries entered into Nifty 50 by replacing Hindustan Petroleum Corporation Ltd. HPCL will move into Nifty Next 50 From 27 September, Nestle India will be included in NSE Nifty 50 Index and Nifty 50 Equal Weight Index. It will be replacing India bulls Housing Finance Ltd.

List of 50 companies that form part of NIFTY 50 Index as on May 2020:

Table 3

Company Name	Symbol	Sector
IOC	IOC.NS	Energy Oil &Gas
ITC Limited	ITC.NS	Consumer Goods
JSW Steel	JSWSTEEL.NS	Metals
Kotak Mahindra Bank	KOTAKBANK.NS	Banking
Larsen & Toubro	LT.NS	Construction
Mahindra & Mahindra	M&M.NS	Automobile
Maruti Suzuki	MARUTI.NS	Automobile
Nestle India	NESTLEIND.NS	Consumer Goods
NTPC	NTPC.NS	Energy Power
ONGC	ONGC.NS	Energy Oil &Gas
Power Grid Corporation of India	POWERGRID.NS	Energy Power
Tata Consultancy Services	TCS.NS	Information Technology
Tata Motors	TATAMOTORS.NS	Automobile
Tata Steel	TATASTEEL.NS	Metals
Tech Mahindra	TECHM.NS	Information Technology
Titan Company	TITAN.NS	Consumer Goods
Ultra Tech Cement	ULTRACEMCO.NS	Cement
United Phosphorus Limited	UPL.NS	Chemicals
Vedanta	VEDL.NS	Metals
Wipro	WIPRO.NS	Information Technology
Zee Entertainment Enterprises	ZEEL.NS	Media & Entertainment

Table 4

S. No.	Date	Fall	Reason
1	28-Oc-97	8.01%	Investors deserted emerging Asian shares during the Asian Financial Crisis. Crashesalso occurred in Thailand, Indonesia, South Korea, Philippines.
2	21-Jan-08	10%	Due to the US Subprime Mortgage Crisis.
3	16-Aug-13	4.08% (234.45 Points)	Due to depreciation of the Indian Rupee[12,13]
4	24-Aug-15	5.92% (490.95 Points)	Driven by the meltdown in the Chinese Stock market.[14]
5	24-Jun-16	181.5 Points	Driven by the Brexit Referendum.[15]

6	11-Nov-16	229.45 Points	Driven by the Demonetization move by the Indian Government and the 2016 US Election Results.[16]
7	02-Feb-18	256.30 Points	Driven by the 2018 Union budget of India and Global breakdown.
8	24-Sep-18	175.55 Points	Panic Fall, wherein in the last trading session (21 September 2018) there were rumors of Fraud by Housing Loan companies
9	4-Oct-18	303.20 Points	Panic Fall, due to Oil price Increase and rupee fall against US Dollar.
10	5-Oct-18	282.80 Points	Panic Fall, due to Oil price Increase and rupee fall against US Dollar.
11	5-Jul-19	132.80 Points	Due to Union Budget FY 2019.
12	8-Jul-19	252.55 Points	Due to Union Budget FY 2019. (Downfall Continues)
13	22-Aug-19	177.35 Points	
14	03-Sep-19	246.75 points	Due to Multiple PSU Bank Merger Announcements
15	17-Sep-19	177.70 points	
16	1-Feb-20	373.95 points (3.11%)	Driven by the Union Budget FY 2020 and coronavirus pandemic which saw global breakdown a day before Budget.[17]
17	9-Mar-20	538.00 points (4.90%)	Driven by the impact of Coronavirus disease 2019
18	12-Mar-20	868.25 points (8.30%)	Driven by the impact of Coronavirus disease 2019 after WHO declared it a Pandemic
19	16-Mar-20	757.80 points (7.61%)	Driven by the impact of Coronavirus disease 2019
20	23-Mar-20	1135.20 points (12.98%)	Driven by the impact of Coronavirus disease 2019

Table 5

S. No.	Date	High	Probable Reason
1	20-May-19	3.69 % (421.10 points)	Exit Polls of 2019 General elections predict clear majority for BJP government.
2	23 May-19	2.49 % (300.90 points)	Results of the 2019 General Elections in which BJP led NDA alliance wins.
3	8 Aug 2019	1.63% (176.95 points)	FPI surcharge rollback
4	26 Aug 2019	2.16% (234.45 points)	Relief measures, likely US-China trade talks begin.[2]
5	20 Sep 2019	6.12% (655.45 points)	Indian FM announced a cut in the corporate tax rate for domestic companies and new domestic manufacturing companies
6	23 Sep 2019	3.73% (420.65 points)	Corporate tax cut following effect
7	7 April 2020	708.40 (8.76%)	Italy Coronavirus Nos went down

Major Single Day Falls

Following are some of the notable single-day falls of the NIFTY 50 Index.

Major Single Day Gains

Following are some of the notable single-day gains of the NIFTY 50 Index.

ALL-TIME HIGHS

- All-time Closing high was 12,355.50 on 16 January 2020
- All Time Intraday high was 12,389.05 on 16 January 2020

Derivatives

Trading in call and put options on the Nifty 50 are offered by the NSE.

Nifty Next 50

NIFTY Next 50, also called NIFTY Junior, is an index of 50 companies whose free float market capitalization comes after that of the companies in NIFTY 50. NIFTY Next 50 constituents are thus potential candidates for future inclusion in NIFTY 50.

Table 6

Company Name	Symbol	Sector
ACC	ACC	Cement
Adani Transmission	ADANITRANS	Energy - Power
Company Name	Symbol	Sector
Ambuja Cements	AMBUJACEM	Cement
Ashok Leyland	ASHOKLEY	Automobile
Aurobindo Pharma	AUROPHARMA	Pharmaceuticals
Avenue Supermarts	DMART	Consumer Goods
Bajaj Holdings	BAJAJHLDNG	Financial Services
Bandhan Bank	BANDHANBNK	Banking
Bank of Baroda	BANKBARODA	Banking
Berger Paints	BERGEPAINT	Consumer Goods
Biocon	BIOCON	Pharmaceuticals
Bosch	BOSCHLTD	Automobile
Cadila Healthcare	CADILAHC	Pharmaceuticals
Colgate-Palmolive	COLPAL	Consumer Goods
Container Corporation of India	CONCOR	Services Transport & Logistics
Dabur	DABUR	Consumer Goods
Divi's Laboratories	DIVISLAB	Pharmaceuticals
Motherson Sumi Systems	MOTHERSUMI	Automobile
NHPC Limited	NHPC	Energy Power
NMDC	NMDC	Metals
New India Assurance	NIACL	Financial Services
Oracle Financial Services Software	OFSS	Information Technology
Page Industries	PAGEIND	Textiles
Petronet LNG	PETRONET	Energy Oil & Gas
Pidilite Industries	PIDILITIND	Chemicals
Piramal Enterprises	PEL	Pharmaceuticals
Power Finance Corporation	PFC	Financial Services
Procter & Gamble	PGHH	Consumer Goods
Punjab National Bank	PNB	Banking
SBI Life Insurance Company	SBILIFE	Financial Services
Shriram Transport Finance	SRTRANSFIN	Financial Services
Siemens	SIEMENS	Industrial Manufacturing
United Breweries	UBL	Consumer Goods
United Spirits	MCDOWELL-N	Consumer Goods
Vodafone Idea	IDEA	Telecommunication

Return and Risk

Risk and return is a complex topic. There are many types of risk and many ways to evaluate and measure risk. In the theory and practice of investing, a widely used definition of risk is:

"Risk is the uncertainty that an investment will earn its expected rate of return."

Note that this definition does not distinguish between loss and gain. Typically, individual investors think of risk as the possibility that their investments could lose money. They are likely to be quite happy with an investment return that is greater than expected- a "positive surprise." However, since risky assets generate negative surprises as well as positive ones, defining risk as the uncertainty of the rate of return is reasonable. Greater uncertainty results in greater likelihood that the investment will generate larger gains, as well as greater likelihood that the investment will generate larger losses (in the short term) and in higher or lower accumulated value (in the long term.).

In financial planning, the investment goal must be considered in defining risk. If your goal is to provide an acceptable amount of retirement income, you should construct an investment portfolio to generate an expected return that is sufficient to meet your investment goal. But because there is uncertainty that the portfolio will earn its expected long-term return, the long-term realized return may fall short of the expected return. This raises the possibility that available retirement funds fall short of needs - that is, the investor might outlive the investment portfolio. This is an example of "shortfall risk." The magnitude and consequences of the potential shortfall deserve special consideration from investors. However, since the uncertainty of return could also result in a realized return that is higher than the expected return, the investment portfolio might "outlive" the investor. Therefore, considerations of shortfall risk

are subsumed by considering risk as the uncertainty of investment return.

Return and Risk

In investing, risk and return are highly correlated. Increased potential returns on investment usually go hand-in-hand with increased risk. Different types of risks include project-specific risk, industry-specific risk, competitive risk, international risk and market risk. Return refers to either gains and losses made from trading a security.

The return on an investment is expressed as a percentage and considered a random variable that takes any value within a given range. Several factors influence the type of returns that investors can expect from trading in the markets.

Diversification allows investors to reduce the overall risk associated with their portfolio but may limit potential returns. Making investments in only one market sector may, if that sector significantly outperforms the overall market, generate superior returns, but should the sector decline then you may experience lower returns than could have been achieved with a broadly diversified portfolio.

Diversification Reduces or Eliminates Firm-Specific Risk

First, each investment in a diversified portfolio represents only a small percentage of that portfolio. Thus, any risk that increases or reduces the value of that particular investment or group of investments will only have a small impact on the overall portfolio.

Second, the effects of firm-specific actions on the prices of individual assets in a portfolio can be either positive or negative for each asset for any period. Thus, in large portfolios, it can be reasonably argued that positive and negative factors will average out so as not to affect the overall risk level of the total portfolio.

The benefits of diversification can also be shown mathematically: ***σ^2portfolio= WA^2σA^2 + WB^2σB^2*** + 2WA WBp ABσ AσB Where:

σ = standard deviation

W = weight of the investment A = asset A

B = asset B

p = covariance

Other things remaining equal, the higher the correlation in returns between two assets, the smaller are the potential benefits from diversification.

Comparative Analysis of Risk and Return Models

- The Capital Asset Pricing Model (CAPM)
- APM
- Multifactor model
- Proxy models
- Accounting and debt-based models

For investments with equity risk, the risk is best measured by looking at the variance of actual returns around the expected return. In the CAPM, exposure to market risk is measured by a market beta. The APM and the multifactor model allow for examining multiple sources of market risk and estimate betas for an investment relative to each source. Regression or proxy model for risk looks for firm characteristics, such as size, that have been correlated with high returns in the past and uses them to measure market risk.

On investments with default risk, the risk is measured by the likelihood that the promised cash flows might not be delivered. Investments with higher default risk usually charge higher interest rates and the premium that we demand over a riskless rate is called the default premium. Even in the absence of ratings, interest rates will include a default premium that reflects the lenders' assessments of default risk. These default risk-adjusted interest rates represent the cost of borrowing or debt for a business.

Correlation

Correlation, in the finance and investment industries, is a statistic that measures the degree to which two securities move in relation to each other. Correlations are used in advanced portfolio management, computed as the correlation coefficient, which has a value that must fall between -1.0 and +1.0.

Correlation refers to a process for establishing whether or not relationships exist between two variables. You learned that a way to get a general idea about whether or not two variables are related is to plot them on a "scatter plot". While there are many measures of association for variables which are measured at the ordinal or higher level of measurement, correlation is the most commonly used approach.

Correlation in Statistics

This section shows how to calculate and interpret correlation coefficients for ordinal and interval level scales. Methods of correlation summarize the relationship between two variables in a single number called the correlation coefficient. The correlation coefficient is usually given the symbol *r* and it ranges from -1 to +1.

A correlation coefficient quite close to 0, but either positive or negative, implies little or no relationship between the two variables. A correlation coefficient close to plus 1 means a positive relationship between the two variables, with increases in one of the variables being associated with increases in the other variable.

A correlation coefficient close to -1 indicates a negative

relationship between two variables, with an increase in one of the variables being associated with a decrease in the other variable. A correlation coefficient can be produced for ordinal, interval or ratio level variables, but has little meaning for variables which are measured on a scale which is no more than nominal.

For ordinal scales, the correlation coefficient which is usually calculated is Spearman's rho. For interval or ratio level scales, the most commonly used correlation coefficient is Pearson's r, ordinarily referred to as simply the correlation coefficient.

Understanding Correlation

Correlation shows the strength of a relationship between two variables and is expressed numerically by the correlation coefficient. The correlation coefficient's values range between -1.0 and 1.0. A perfect positive correlation means that the correlation coefficient is exactly 1. This implies that as one security moves, either up or down, the other security moves in lockstep, in the same direction. A perfect negative correlation means that two assets move in opposite directions, while a zero correlation implies no linear relationship at all.

For example, large-cap mutual funds generally have a high positive correlation to the Standard and Poor's (S&P) 500 Index or nearly one. Small-cap stocks have a positive correlation to the S&P, but it's not as high or approximately 0.8.

However, put option prices and their underlying stock prices will tend to have a negative correlation. For review, a put option gives the owner the right, but not the obligation, to sell a specific amount of an underlying security at a pre-determined price within a specified time frame. Put option contracts become more profitable when the underlying stock price decreases. In other words, as the stock price increases, the put option prices go down, which is a direct and high-magnitude negative correlation.

Correlation Coefficient

The correlation coefficient, r, is a summary measure that describes the extent of the statistical relationship between two interval or ratio level variables. The correlation coefficient is scaled so that it is always between -1 and +1. When r is close to 0 this means that there is little relationship between the variables and the farther away from 0 r is, in either the positive or negative direction, the greater the relationship between the two variables.

The two variables are often given the symbols X and Y. In order to illustrate how the two variables are related, the values of X and Y are pictured by drawing the scatter diagram, graphing combinations of the two variables. The scatter diagram is given first and then the method of determining Pearson's r is presented. In presenting the following examples, relatively small sample sizes are given. Later, data from larger samples are given.

Types of Correlation

The scatter plot explains the correlation between the two attributes or variables. It represents how closely the two variables are connected. There can be three such situations to see the relation between the two variables.

Positive Correlation: When the value of one variable increases with respect to another.

Negative Correlation: When the value of one variable decreases with respect to another.

No Correlation: When there is no linear dependence or no relation between the two variables.

Correlation Formulas

Correlation shows the relation between two variables. Correlation coefficient shows the measure of correlation. To compare two datasets, we use the correlation formulas.

Pearson correlation coefficient formula

The most common formula is the Pearson Correlation coefficient used for linear dependency between the data set. The value of the coefficient lies between -1 to +1. When the coefficient comes down to zero, then the data is considered as not related. While, if we get the value of +1, then the data are positively correlated and -1 has a negative correlation.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y}}$$

Where, n = Quantity of Information Σx = Total of the First Variable Value

Σy= Total of the Second Variable Value

Σxy= Sum of the Product of & Second Value

Σx^2 = Sum of the Squares of the First Value

Σy^2 = Sum of the Squares of the Second Value

Linear Correlation Coefficient Formula

The formula for the linear correlation coefficient is given by;

$$r_{xy} = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{\sqrt{n\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}\sqrt{n\sum_{i=1}^{n} y_i^2 - (\sum_{i=1}^{n} y_i)^2}}$$

Sample Correlation Coefficient Formula

The formula is given by:

$r_{xy} = S_{xy}/S_xS_y$

Where S_x and S_y are the sample standard deviations and Sxy is the sample covariance.

Population Correlation Coefficient formula

The population correlation coefficient uses σx and σy as the

population standard deviations and σxy as the population covariance.

$r_{xy} = \sigma_{xy}/\sigma_x\sigma_y$

t-test

A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features. It is mostly used when the data sets, like the data set recorded as the outcome from flipping a coin 100 times, would follow a normal distribution and may have unknown variances. A t-test is used as a hypothesis testing tool, which allows testing of an assumption applicable to a population.

A t-test looks at the t-statistic, the t-distribution values and the degrees of freedom to determine the statistical significance. To conduct a test with three or more means, one must use an analysis of variance.

Ambiguous test Results

Consider that a drug manufacturer wants to test a newly invented medicine. It follows the standard procedure of trying the drug on one group of patients and giving a placebo to another group, called the control group. The placebo given to the control group is a substance of no intended therapeutic value and serves as a benchmark to measure how the other group, which is given the actual drug, responds.

After the drug trial, the members of the placebo-fed control group reported an increase in average life expectancy of three years, while the members of the group who are prescribed the new drug report an increase in average life expectancy of four years. Instant observation may indicate that the drug is indeed working as the results are better for the group using the drug. However, it is also possible that the observation may be due to a chance occurrence, especially a surprising piece of luck. A t-test is useful to conclude if the results are actually correct and applicable to the entire population.

In a school, 100 students in class A scored an average of 85% with a standard deviation of 3%. Another 100 students belonging to class B scored an average of 87% with a standard deviation of 4%. While the average of class B is better than that of class A, it may not be correct to jump to the conclusion that the overall performance of students in class B is better than that of students in class A. This is because there is natural variability in the test scores in both classes, so the difference could be due to chance alone. A t-test can help to determine whether one class fared better than the other.

t-Test Assumptions

- The first assumption made regarding t-tests concerns the scale of measurement. The assumption for a t-test is that the scale of measurement applied to the data collected follows a continuous or ordinal scale, such as the scores for an IQ test.
- The second assumption made is that of a simple random sample, that the data is collected from a representative, randomly selected portion of the total population.
- The third assumption is the data, when plotted, results in a normal distribution, bell- shaped distribution curve.
- The final assumption is the homogeneity of variance. Homogeneous, or equal, variance exists when the standard deviations of samples are approximately equal.

Calculating t-Test

Calculating a t-test requires three key data values. They include the difference between the mean values from each data set (called the mean difference), the standard deviation of each group and the number of data values of each group.

The outcome of the t-test produces the t-value. This calculated t-value is then compared against a value obtained from a critical value table (called the T-Distribution Table). This comparison helps to determine the effect of chance alone on the difference and whether the difference is outside that chance range. The t-test questions whether the difference between the groups represents a true difference in the study or if it is possibly a meaningless random difference.

T-Distribution Tables

The T-Distribution Table is available in one-tail and two-tails formats. The former is used for assessing cases which have a fixed value or range with a clear direction (positive or negative). For instance, what is the probability of output value remaining below -3, or getting more than seven when rolling a pair of dice? The latter is used for range bound analysis, such as asking if the coordinates fall between -2 and +2.

The calculations can be performed with standard software programs that support the necessary statistical functions, like those found in MS Excel.

T-Values and Degrees of Freedom

The t-test produces two values as its output: t-value and degrees of freedom. The t-value is a ratio of the difference between the mean of the two sample sets and the variation that exists within the sample sets. While the numerator value (the difference between the mean of the two sample sets) is straightforward to calculate, the denominator (the variation that exists within the sample sets) can become a bit complicated depending upon the type of data values involved. The denominator of the ratio is a measurement

of the dispersion or variability. Higher values of the t-value, also called t-score, indicate that a large difference exists between the two sample sets. The smaller the t-value, the more similarity exists between the two sample sets.

- A large t-score indicates that the groups are different
- A small t-score indicates that the groups are similar

Degrees of freedom refers to the values in a study that has the freedom to vary and are essential for assessing the importance and the validity of the null hypothesis. Computation of these values usually depends upon the number of data records available in the sample set.

Correlated (or paired) t-Test

The correlated t-test is performed when the samples typically consist of matched pairs of similar units, or when there are cases of repeated measures. For example, there may be instances of the same patients being tested repeatedly—before and after receiving a particular treatment. In such cases, each patient is being used as a control sample against themselves.

This method also applies to cases where the samples are related in some manner or have matching characteristics, like a comparative analysis involving children, parents or siblings. Correlated or paired t-tests are of a dependent type, as these involve cases where the two sets of samples are related.

The formula for computing the t-value and degrees of freedom for a paired t-test is:

$$t - value = \frac{mean1 - mean2}{sp * \sqrt{\frac{2}{n}}}$$

Where

$$sp = \sqrt{\frac{var1^2 + var2^2}{2}}$$

$$Degrees\ of\ freedom = (2n - 2)$$

The remaining two types belong to the independent t-tests. The samples of these types are selected independent of each other—that is, the data sets in the two groups don't refer to the same values. They include cases like a group of 100 patients being split into two sets of 50 patients each. One of the groups becomes the control group and is given a placebo, while the other group receives the prescribed treatment. This constitutes two independent sample groups which are unpaired with each other.

Equal variance (or pooled) t-Test

The equal variance t-test is used when the number of samples in each group is the same, or the variance of the two data sets is similar. The following formula is used for calculating t- value and degrees of freedom for equal variance t-test.

Determining the Correct t-test to use

The following flowchart can be used to determine which t-test should be used based on the characteristics of the sample sets. The key items to be considered include whether the sample records are similar, the number of data records in each sample set and the variance of each sample set.

Unequal Variance t-Test Example

Assume that we are taking a diagonal measurement of paintings received in an art gallery. One group of samples includes 10 paintings, while the other includes 20 paintings. The data sets, with the corresponding mean and variance values, are as follows.

Though the mean of Set 2 is higher than that of Set 1, we cannot conclude that the population corresponding to Set 2 has a higher mean than the population corresponding to Set 1. Is the difference from 19.4 to 21.6 due to chance alone, or do differences really exist in the overall populations of all the paintings received in the art gallery? We establish the problem by assuming the null hypothesis that the mean is the same between the two sample sets and conduct a t-test to test if the hypothesis is plausible.

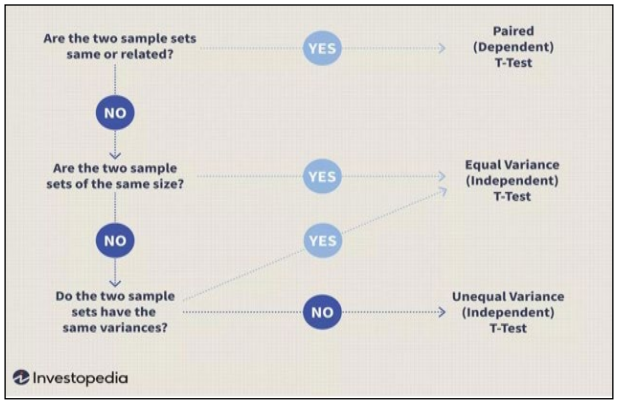

Figure 1

	Set 1	Set 2
	19.7	28.3
	20.4	26.7
	19.6	20.1
	17.8	23.3
	18.5	25.2
	18.9	22.1
	18.3	17.7
	18.9	27.6
	19.5	20.6
	21.95	13.7
		23.2
		17.5
		20.6

		18
		23.9
		21.6
		24.3
		20.4
		23.9
		13.3
Mean	19.4	21.6
Variance	1.4	17.1

Since the number of data records is different (n1 = 10 and n2 = 20) and the variance is also different, the t-value and degrees of freedom are computed for the above data set using the formula mentioned in the Unequal Variance T-Test section.

The t-value is -2.24787. Since the minus sign can be ignored when comparing the two t- values, the computed value is 2.24787.

The degrees of freedom value is 24.38 and is reduced to 24, owing to the formula definition requiring rounding down of the value to the least possible integer value.

One can specify a level of probability (alpha level, level of significance, p) as a criterion for acceptance. In most cases, a 5% value can be assumed.

Using the degree of freedom value as 24 and a 5% level of significance, a look at the t-value distribution table gives a value of 2.064. Comparing this value against the computed value of 2.247 indicates that the calculated t-value is greater than the table value at a significance level of 5%. Therefore, it is safe to reject the null hypothesis that there is no difference between means. The population set has intrinsic differences and they are not by chance.

Analysis of Variance (ANOVA)

Analysis of variance (ANOVA) is a collection of statistical models and their associated estimation procedures (such as the "variation" among and between groups) used to analyse the differences among group means in a sample. ANOVA was developed by statistician and evolutionary biologist Ronald Fisher. The ANOVA is based on the law of total variance, where the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In its simplest form, ANOVA provides a statistical test of whether two or more population means are equal and therefore generalizes the t-test beyond two means.

History

While the analysis of variance reached fruition in the 20th century, antecedents extend centuries into the past according to Stigler. These include hypothesis testing, the partitioning of sums of squares, experimental techniques and the additive model. Laplace was performing hypothesis testing in the 1770s. The development of least-squares methods by Laplace and Gauss circa 1800 provided an improved method of combining observations (over the existing practices then used in astronomy and geodesy). It also initiated much study of the contributions to sums of squares. Laplace knew how to estimate a variance from a residual (rather than a total) sum of squares. By 1827, Laplace was using least squares methods to address ANOVA problems regarding measurements of atmospheric tides. Before 1800, astronomers had isolated observational errors resulting from reaction times (the "personal equation") and had developed methods of reducing the errors. The experimental methods used in the study of the personal equation were later accepted by the emerging field of psychology which developed strong (full factorial) experimental methods to which randomization and blinding were soon added. An eloquent non-mathematical explanation of the additive effects model was available in 1885.

Ronald Fisher introduced the term variance and proposed its formal analysis in a 1918 article The Correlation Between Relatives on the Supposition of Mendelian Inheritance. His first application of the analysis of variance was published in 1921. Analysis of variance became widely known after being included in Fisher's 1925 book Statistical Methods for Research Workers.

Randomization models were developed by several researchers. The first was published in Polish by Jerzy Neyman in 1923.

One of the attributes of ANOVA that ensured its early popularity was computational elegance. The structure of the additive model allows solution for the additive coefficients by simple algebra rather than by matrix calculations. In the era of mechanical calculators this simplicity was critical. The determination of statistical significance also required access to tables of the F function which were supplied by early statistics texts.

Background and Terminology

ANOVA is a form of statistical hypothesis testing heavily used in the analysis of experimental data. A test result (calculated from the null hypothesis and the sample) is called statistically significant if it is deemed unlikely to have occurred by chance, assuming the truth of the null hypothesis. A statistically significant result, when a probability (p-value) is less than a pre-specified threshold (significance level), justifies the rejection of the null hypothesis, but only if the a priori probability of the null hypothesis is not high.

In the typical application of ANOVA, the null hypothesis is that all groups are random samples from the same population. For example, when studying the effect of different treatments on similar samples of patients, the null hypothesis would be that all treatments have the same effect (perhaps none). Rejecting the null hypothesis is taken to mean that the differences in observed effects between treatment groups are unlikely to be due to random chance.

By construction, hypothesis testing limits the rate of Type I errors (false positives) to a significance level. Experimenters also wish to limit Type II errors (false negatives). The rate of Type II errors depends largely on sample size (the rate is larger for smaller samples), significance level (when the standard of proof is high, the chances of overlooking a discovery are also high) and effect size (a smaller effect size is more prone to Type II error).

The terminology of ANOVA is largely from the statistical design of experiments. The experimenter adjusts factors and measures responses in an attempt to determine an effect. Factors are assigned to experimental units by a combination of randomization and blocking to ensure the validity of the results. Blinding keeps the weighing impartial. Responses show a variability that is partially the result of the effect and is partially random error.

ANOVA is the synthesis of several ideas and it is used for multiple purposes. As a consequence, it is difficult to define concisely or precisely.

"Classical" ANOVA for balanced data does three things at once

- As exploratory data analysis, an ANOVA employs an additive data decomposition and its sums of squares indicate the variance of each component of the decomposition (or, equivalently, each set of terms of a linear model).
- Comparisons of mean squares, along with an F-test allow testing of a nested sequence of models.
- Closely related to the ANOVA is a linear model fit with coefficient estimates and standard errors.

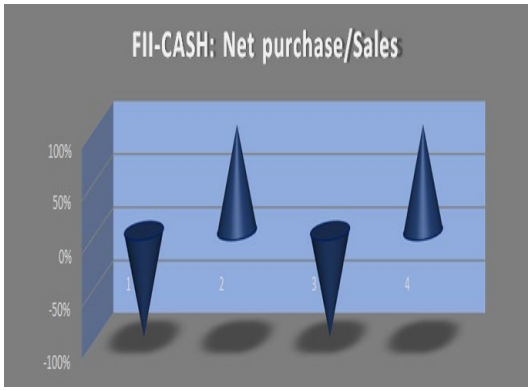

Figure 2

In short, ANOVA is a statistical tool used in several ways to develop and confirm an explanation for the observed data.

Additionally

- It is computationally elegant and relatively robust against violations of its assumptions
- ANOVA provides strong (multiple sample comparison) statistical analysis.x
- It has been adapted to the analysis of a variety of experimental designs

As a result: ANOVA "has long enjoyed the status of being the most used (some would say abused) statistical technique in psychological research." ANOVA "is probably the most useful technique in the field of statistical inference."

Table 7. FII-F&O: Net Purchase/Sales

Year	FIIs-CASH: Net purchase/ sales	Year	FIIs-CASH: Net purchase/ sales
Jan-16	-1901.32	Jul-17	-10249.17
Feb-16	8704.46	Aug-17	-2228.53
Mar-16	26473.17	Sep-17	-9468.68
Apr-16	-6627.56	Oct-17	-29201.2
May-16	-452.54	Nov-17	4934.11
Jun-16	-4051.43	Dec-17	-1103.37
Jul-16	1464.85	Jan-18	127.67
Aug-16	-15995.63	Feb-18	13564.57
Sep-16	-23969.97	Mar-18	32371.43
Oct-16	-7826.53	Apr-18	12749.55
Nov-16	-13514.78	May-18	-2135.85
Dec-16	-6411.57	Jun-18	-688.5
Jan-17	9568	Jul-18	-16870.13
Feb-17	-18619.15	Aug-18	-14828.76
Mar-17	7904.85	Sep-18	-6624.05
Apr-17	-9620.56	Oct-18	8595.66
May-17	-12359.71	Nov-18	12924.93
Jun-17	-10249.17	Dec-18	694.12
		Jan-19	-5359.51
Average return			-2440.008108
Risk			12785.71737
Consistency			-5.240030692
Grwoth			1.218430552

ANOVA is difficult to teach, particularly for complex experiments, with split-plot designs being notorious. In some cases, the proper application of the method is best determined by problem pattern recognition followed by the consultation of a classic authoritative test.

Table 8.FII-F&O: Net Purchase/Sales

Year	FII-F&O: Net Purchase/ Sale	Year	FII-F&O: Net Purchase/ Sale
Jan-16	3602.55	Jul-17	-7597.18
Feb-16	3091.98	Aug-17	-3207.91
Mar-16	4803.74	Sep-17	-5371.32
Apr-16	-4951.11	Oct-17	-7917.57
May-16	-629.04	Nov-17	7877.27
Jun-16	-3090.4	Dec-17	-434.08
Jul-16	-6554.83	Jan-18	-1978.05
Aug-16	-5145.4	Feb-18	4291.8
Sep-16	-7352.5	Mar-18	9941.28
Oct-16	1977.73	Apr-18	2669.44
Nov-16	-5248.67	May-18	-5991.78
Dec-16	-331.18	Jun-18	914.17
Jan-17	-3131.15	Jul-18	-10020.92
Feb-17	-11717.67	Aug-18	-5594.65
Mar-17	-8982.09	Sep-18	7053.5
Apr-17	6579.93	Oct-18	717.03
May-17	-4664.4	Nov-18	-588.37
Jun-17	-7597.18	Dec-18	-559.03
		Jan-19	-10122.77
average return			-2034.022432
risk			5539.118959
consistency			-2.723233958
Grwoth			-0.1651272

Data Analysis and Interpretation

Interpretation

Average returns of FII -Cash is -2440.00 during the study period. There is a variation of 12785.71 and its consistency is -5.2400 registering growth of 1.218.Interpretation.

The Average Return, Risk, Consistency and Growth of FII-F&O are -2034.02, 5539.11, - 2.723 and -0.16 respectively during the study period.

Interpretation

There is consistency of DII-Cash is 1.2591 over the study period incorporating negative growth of 3.81%

Interpretation:

There is consistency of DII-Cash is 1.2591 over the study period incorporating negative growth of 3.81%

Interpretation

The most consistency of DII F&O is 0.366 whose growth rate is 0.4165.

Interpretation

The Average return, Risk, Consistency and Growth of FII SEBI-Equity are 3253.62, 13266.53, 4.077 and 1.096 respectively.

Figure 3

Table 9

Year	DII-CASH: Net Purchase/ Sales	Year	DII-CASH: Net Purchase/ Sales
Jan-16	4503.94	Jul-17	14146.15
Feb-16	935.26	Aug-17	2822.72
Mar-16	-4395.61	Sep-17	12504.04
Apr-16	9247.43	Oct-17	26033.9
May-16	4277.06	Nov-17	1309.47
Jun-16	6676.11	Dec-17	375.55
Jul-16	4786.37	Jan-18	2146.87
Aug-16	16205.22	Feb-18	-565.89
Sep-16	21025.53	Mar-18	-13930.25
Oct-16	10090.91	Apr-18	-4219.46
Nov-16	9243.21	May-18	5316.34
Dec-16	8142.88	Jun-18	3643.31
Jan-17	398.73	Jul-18	20394.52
Feb-17	17813.01	Aug-18	20933.59
Mar-17	6693.91	Sep-18	12490.81

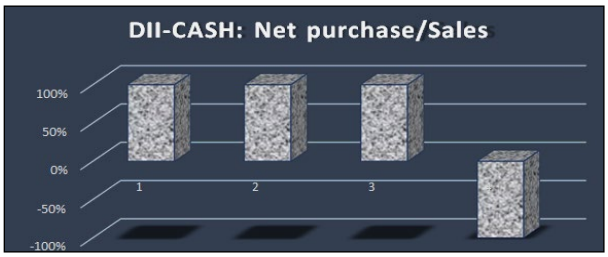

Figure 4

Interpretation

FII SEBI-DEBT's Average return is 2660.09. Its risk, consistency and Growth are 11282.96, 4.24 and 1.628 respectively during the study period.

Table 10. DII-Cash: Net Purchase/Sales

Year	DII-CASH: Net Purchase/ Sales	Year	DII-CASH: Net Purchase/ Sales
Jan-16	4503.94	Jul-17	14146.15
Feb-16	935.26	Aug-17	2822.72
Mar-16	-4395.61	Sep-17	12504.04
Apr-16	9247.43	Oct-17	26033.9
May-16	4277.06	Nov-17	1309.47
Jun-16	6676.11	Dec-17	375.55
Jul-16	4786.37	Jan-18	2146.87
Aug-16	16205.22	Feb-18	-565.89
Sep-16	21025.53	Mar-18	-13930.25
Oct-16	10090.91	Apr-18	-4219.46
Nov-16	9243.21	May-18	5316.34
Dec-16	8142.88	Jun-18	3643.31
Jan-17	398.73	Jul-18	20394.52
Feb-17	17813.01	Aug-18	20933.59
Mar-17	6693.91	Sep-18	12490.81
Apr-17	8663.88	Oct-18	4758.48
May-17	15054.48	Nov-18	-7970.29
Jun-17	14146.15	Dec-18	-740.76
		Jan-19	1073.49
average return			6865.704324
risk			8644.876101
consistency			1.259139003
Growth			-3.815709001

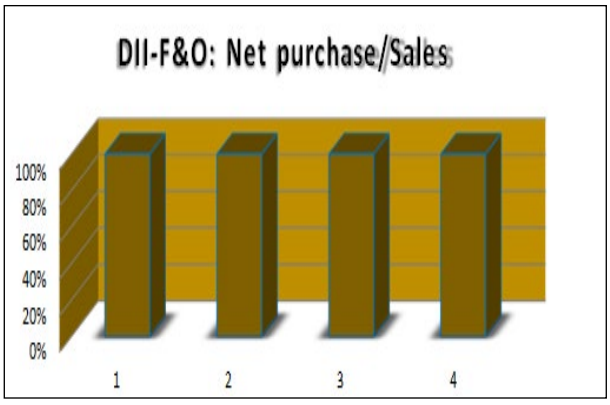

Figure 5

Table 11.DII-F&O: Net purchase/ Sales

Year	DII-F&O: Net purchase/sales	Year	DII-F&O: Net purchase/ sales
Jan-16	5873.76	Jul-17	26959.56
Feb-16	10067.26	Aug-17	5638.3
Mar-16	7335.09	Sep-17	14504.25
Apr-16	17860.55	Oct-17	18868.35
May-16	18116.27	Nov-17	19449.8
Jun-16	12384.39	Dec-17	19049.58
Jul-16	9515.8	Jan-18	11439.64
Aug-16	11684.79	Feb-18	12702.36
Sep-16	13632.54	Mar-18	13665.1
Oct-16	9806.52	Apr-18	18806.26
Nov-16	12167.83	May-18	11440.8
Dec-16	12530.23	Jun-18	21208.67
Jan-17	9551.75	Jul-18	14586.7
Feb-17	19083.94	Aug-18	19676.87
Mar-17	12306.89	Sep-18	19497.32
Apr-17	21618.39	Oct-18	28038.21
May-17	19265.56	Nov-18	22303.98
Jun-17	26959.56	Dec-18	15874.44
		Jan-19	24050.19
average return			15878.95946
risk			5823.805276
consistency			0.3667624
growth			0.416548296

Table 12

Year	DII-F&O: Net purchase/sales	Year	DII-F&O: Net purchase/ sales
Jan-16	-1009.3	Jul-17	-1899.55
Feb-16	10485.18	Aug-17	-2028.81
Mar-16	33781.93	Sep-17	-9622.83
Apr-16	-2208.61	Oct-17	-27622.96
May-16	9956.78	Nov-17	10563.51
Jun-16	4028.23	Dec-17	2299.61
Jul-16	1882.03	Jan-18	-504.54
Aug-16	-12631.74	Feb-18	15328.47
Sep-16	-10758.87	Mar-18	33116.08
Oct-16	1922.57	Apr-18	20119.71
Nov-16	19179.91	May-18	9825.87

Dec-16	-4747.22	Jun-18	1032.87
Jan-17	13383.76	Jul-18	-13315.6
Feb-17	-12491.36	Aug-18	-15551.75
Mar-17	13372.4	Sep-18	-4456.08
Apr-17	-6467.9	Oct-18	14656.65
May-17	-4977.3	Nov-18	22489.64
Jun-17	-1899.55	Dec-18	5433.6
		Jan-19	9719.2
average return			3253.622432
risk			13266.53076
consistency			4.077464745
growth			1.096259673

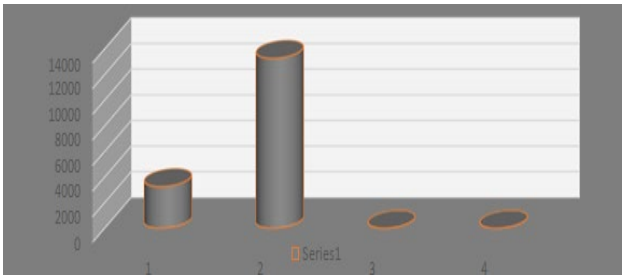

Figure 6

Interpretation

MF SEBI EQUITY's Average return, Risk, Consistency and Growth are 35618.63, 16176.47, 0.4541 and 0.198 respectively during the study period.

Table 13.FII SE BI- DE BT: Net Purchase/ Sales

Year	DII-F&O: Net purchase/sales	Year	DII-F&O: Net purchase/ sales
Jan-16	-3757.43	Jul-17	-10005.65
Feb-16	5980.19	Aug-17	2366.77
Mar-16	26093.88	Sep-17	-10527.94
Apr-16	19401.11	Oct-17	-10019.22
May-16	20197.92	Nov-17	2262.77
Jun-16	24796.34	Dec-17	5804.98
Jul-16	17041.87	Jan-18	-2601.07
Aug-16	15006.22	Feb-18	-9290.38
Sep-16	992.17	Mar-18	15351.47
Oct-16	17960.72	Apr-18	-4570.32
Nov-16	-1426.4	May-18	3788.99
Dec-16	2463.28	Jun-18	7687.18
Jan-17	8931.55	Jul-18	8417.77
Feb-17	-2771.36	Aug-18	11414.83
Mar-17	-7297.82	Sep-18	-454.45
Apr-17	-11868.3	Oct-18	5055.55
May-17	-17543.09	Nov-18	-3223.8
Jun-17	-10005.65	Dec-18	-6015.14
	average return		2660.091081
	risk		2660.091081
	consistency		4.241571414
	growth		1.628312813

Interpretation

MF SEBI DEBTs the Average return of MF SEBI DEBT is 7543.17 during the study period. Its consistency is also healthy since it is less than 1. However, Growth is negative during the study period.

Table 14.MF SEBI-Equity: Net purchase/ Sales

Year	MF SEBI-EQUITY: Net Purchase/ Sales	Year	MF SEBI-Equity: Net Purchase/ Sales
Jan-16	31104.9	Jul-17	38657.97
Feb-16	38829.6	Aug-17	35744.36
Mar-16	40086.3	Sep-17	16118.04
Apr-16	55932.89	Oct-17	27364.51
May-16	9514.37	Nov-17	52355.4
Jun-16	16047.13	Dec-17	65235
Jul-16	40387.5	Jan-18	54687.93
Aug-16	36466.82	Feb-18	22516.29
Sep-16	31855.24	Mar-18	74116.61
Oct-16	29088.49	Apr-18	49973.77
Nov-16	41978.37	May-18	33850.82
Dec-16	18997.55	Jun-18	44475.67
Jan-17	22587.16	Jul-18	51468.56
Feb-17	26663.12	Aug-18	50088.67
Mar-17	37977.51	Sep-18	31827.36
Apr-17	20164.82	Oct-18	32478.8
May-17	-14085.55	Nov-18	34745.05
Jun-17	38657.97	Dec-18	46217.25
		Jan-19	33713.22
Average return			35618.63432
Risk			16176.47681
Consistency			0.454157694
Growth			0.198938439

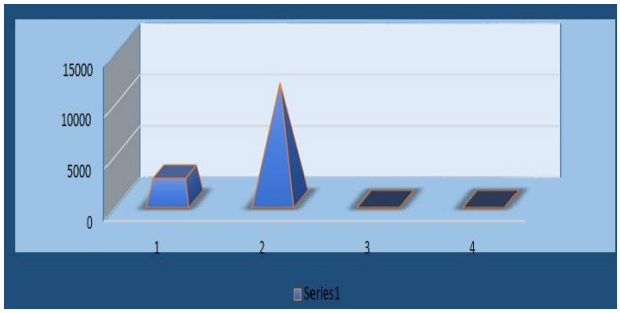

Figure 7

Table 15

Year	MF SEBI-Equity: Net Purchase/ Sales	Year	MF SEBI-Equity: Net Purchase/ Sales
Jan-16	5233.5	Jul-17	6485.78
Feb-16	2039.7	Aug-17	4094.53
Mar-16	2367.6	Sep-17	7904.92
Apr-16	11244.25	Oct-17	24047.32
May-16	9357.68	Nov-17	4895.6
Jun-16	9199.39	Dec-17	2918.97
Jul-16	11799.85	Jan-18	6541.54
Aug-16	17941.11	Feb-18	477.9
Sep-16	9990.5	Mar-18	-5861.43
Oct-16	12080.1	Apr-18	-5005.08
Nov-16	8333.3	May-18	4809.07
Dec-16	8990.75	Jun-18	6538.28
Jan-17	15832.27	Jul-18	14846.75
Feb-17	9255.5	Aug-18	18305.61
Mar-17	9255.5	Sep-18	8569.23
Apr-17	11293.46	Oct-18	3271.51
May-17	13618.82	Nov-18	-5360.55
Jun-17	6485.78	Dec-18	-2862.72
		Jan-19	
Average return			7543.171622
Risk			6799.911118
Consistency			0.901465784
Growth			-1.565818503

Correlation

Interpretation

The majority of variables under correlation is positively weak. DII cash and DII F and O, MF SEBI DEBT negatively correlated with other variables under study.

MFSEBI Equity has positively correlated with other variable under study. FII SEBI Equity has strong positively correlated with FII-CASH and DII-CASH and MF SEBI DEBT. FII CASH is also strongly positively correlated with other variables under study.

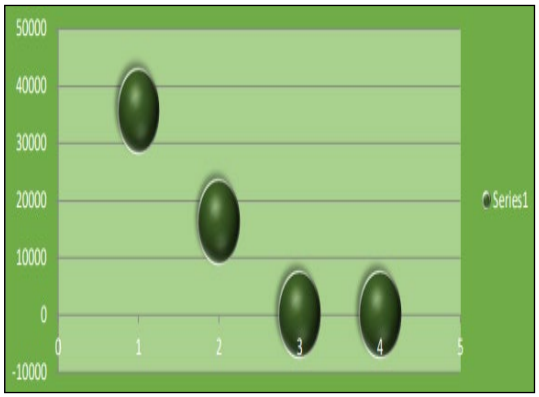

Figure 8

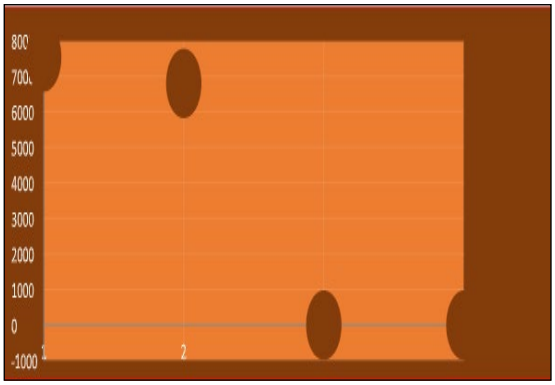

Figure 9

Analysis of Variance

Interpretation

It is evident from the statistic that P value is less than 0.05. Hence, Null hypothesis is rejected and therefore significant differences and among them.

Findings

- Average returns of FII -Cash is -2440.00 during the study period. There is a variation of 12785.71 and its consistency is -5.2400 registering growth of 1.218.
- The Average Return, Risk, Consistency and Growth of FII-F&O are -2034.02, 5539.11, -2.723 and -0.16 respectively during the study period.
- There is consistency of DII-Cash is 1.2591 over the study period incorporating negative growth of 3.81%
- The most consistency of DII F&O is 0.366 whose growth rate is 0.4165.
- The Average return, Risk, Consistency and Growth of FII SEBI-Equity are 3253.62 , 13266.53, 4.077 and 1.096 respectively

Table 16

		FII		DII		FII SEBI		MF SEBI	
		Cash	F&O	CASH	F&O	Equity	DEBT	Equity	DEBT
FII	Cash	1	0.625706	-0.91586	-0.19543	0.891294	0.275664	0.30586	-0.80593
	F&O	1	1	-0.60685	-0.12396	0.489235	0.187334	0.16455	-0.50603
DII	Cash	-0.91586	-0.60685	1	0.179824	-0.86788	-0.18843	-0.32011	0.892853
	F&O	-0.19543	-0.12396	0.179824	1	-0.13101	-0.38585	0.007419	-0.06347
FII SEB I	Equity	0.891294	0.489235	-0.86788	-0.13101	1	0.236652	0.245536	-0.78333
	DEBT	0.275664	0.187334	-0.18843	-0.38585	0.236652	1	0.265561	0.058406
MF SEB I	Equity	0.305866	0.16455	-0.32011	0.007419	0.245536	0.265561	1	-0.30244
	DEBT	-0.80593	-0.50603	-0.892853	-0.06347	-0.78333	0.058406	-0.30244	1

Table 17. ANOVA Summary

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Stat	P-Value
Value	DF	SS	MS		
Between Groups	7	40170189308	5738598473	50.2268	0
Within Groups	288	32905092971	114253795		
Total:	295	73075282280			

- FII SEBI-DEBT'S Average return is 2660.09. Its risk, consistency and Growth are is 11282.96, 4.24 and 1.628 respectively during the study period.
- MF SEBI EQUITY's Average return, Risk, Consistency and Growth are 35618.63, 16176.47, 0.4541 and 0.198 respectively during the study period.
- MF SEBI DEBT's the Average return of MF SEBI DEBT is 7543.17 during the study period. Its consistency is also healthy since it is less than 1. However, Growth is negative during the study period.

Suggestions

- Foreign Institutional Investment should formulate appropriate strategy to increase the returns, decrease the risk. Maintain stability and sharpen the growth with respect to cash market and F&O market.
- Domestic Institutional Investors should set up effective machinery to maintain consistency and high the growth rate of return in respect of cash market.
- Mutual fund SEBI Debts should also take up effective measure for its growth rate

Conclusion

It is concluded that FII-SEBI Equity, FII-SEBI Debt and MUTUAL FUND-SEBI Equity are found to be satisfactory. However, CASH and F&O market in relation to FII and cash market of DII should be given more focus.

Further research can be undertaken to get more effective result to increase the size of the area, period of the study and coverage of the previous period.

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