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# "Investment Anlaysis Using Financial Econometrics and Financial Mathematical Techniques in Capital Markets"

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**ABSTRACT:** Investment in capital market is one of the key factor in economic growth, the growth of the economy is heavily influenced by the growth of the capital market. Investment in capital market requires knowledge about investment alternatives. There are several investment alternatives are available in market. The investor is always influenced by the market movements and growth of the economy. Risk and return of the investment is calculated by the various statistical and econometric models. The present paper is analyzing the investment patterns in capital market. This paper also analyzes the market capitalization of index and also considered the different objectives of investors before investing their money in capital markets.

This paper analyses the capitalization of index for last ten years and also analyze the its influence on investors and necessary recommend better safety measurement to investors.

**Key words:** Investment, capital market, growth, financial econometrics, models and safety.

## I. INTRODUCTION:

Investment can be defined in many ways according to different theories and principles. It is a term that can be used in a number of contexts. However, the different meanings of "investment" are more alike than dissimilar. Generally, investment is the application of money for earning more money. Investment also means savings or savings made through delayed consumption.

According to economists, investment refers to any physical or tangible asset, for example, a building or machinery and equipment. On the other hand, finance professionals define an investment as money utilized for buying financial assets, for example stocks, bonds, bullion, real properties, and precious items.

Investment management is the process of investing a portfolio on an ongoing basis. Investment management includes preparing a strategy, either short- or long-term, to acquire and dispose of portfolio holdings. Also, it can include banking, budgeting, and tax services and duties. In another case, the term refers to managing the holdings within an investment portfolio and trading them to realize a particular investment objective.

Objectives of Investment Depending on the life stage and risk appetite of the investor, there are three main objectives of investment: safety, growth and income. Every investor invests with a specific objective in mind, and each investment has its own unique set of benefits and risks.

### 1.1 Risk and Return characteristics of Investment:

After investing money in a project a firm wants to get some outcomes from the project. The outcomes or the benefits that the investment generates are called returns. Wealth maximization approach is based on the concept of future value of expected cash flows from a prospective project. So cash flows are nothing but the earnings generated by the project that we refer to as returns. Since future is uncertain, so returns are associated with some degree of uncertainty. In other words, there will be some variability in generating cash flows, which we call as risk. In this article we discuss the concepts of risk and returns as well as the relationship between them.

**Risk:**A person making an investment expects to get some returns from the investment in the future. However, as future is uncertain, the future expected returns too are uncertain. It is the uncertainty associated with the returns from an investment that introduces a risk into a project.

**Return:** Return can be defined as the actual income from a project as well as appreciation in the value of capital. Thus there are two components in return—the basic component or the periodic cash flows from the investment either in the form of interest or dividends; and the change in the price of the asset, commonly called as the capital gain or loss.

The major objective of an investment is to earn and maximize the return. Return on investment may be because of income, capital appreciation or a positive hedge against inflation. income is either interest on bonds or debenture, dividend on equity.

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## II. OVERVIEW OF CAPITAL MARKET:

Capital market refers to facilities and institutional arrangements through which short term, medium term and long-term funds), both debt and equity are raised and invested. It provides all with a series of channels through which savings of the community are made available for industrial and commercial enterprises and for the public in general. The capital market consists of development banks, commercial banks and stock exchanges. Capital market provides with many benefits that one might not be able to avail through direct borrowing from a creditor, like: In Capital market, finance is available at reasonable cost. Financial Institutions are sufficiently developed and their processes are well established to provide free, fair, competitive and transparent financial instruments. Capital market is efficient and mostly accurate in providing all necessary information to the investors and borrowers. Besides, all the benefits to an individual organization, Capital markets contribute to the economic development by providing necessary capital for its facilitation. The participants in the capital market are financial institutions, banks, corporate entities, foreign investors and ordinary retail investors from members of the public. The main instruments traded in the capital market are – equity shares, debentures, bonds, preference shares etc.

### 1. Importance of Financial Econometrics and Financial Mathematics Techniques in Capital Market Investments:

The financial markets and, mainly, the stock exchange markets, are complex structures where a very large number of economic entities are acting wishing, first and foremost, to get a profit as high as possible. In this respect, the modern financial markets are distinguishing themselves by a very conspicuous dynamics of the investment activity as far as the portfolio investments are concerned.

Financial econometrics is an active field of integration of finance, economics, probability, statistics, and applied mathematics. Financial activities generate many new problems, economics provides useful theoretical foundation and guidance, and quantitative methods such as statistics, prob1 ability and applied mathematics are essential tools to solve quantitative problems in finance. To name a few, complex financial products pose new challenges on their valuations and risk management. Sophisticated Financial mathematical models have been introduced to capture the salient features of underlying economic variables and used for security pricing. Statistical tools are developed to identify parameters of econometric models, to simulate complex financial systems and to test economic theories via empirical financial data.

## III. LITERATURE REVIEW:

There are several books on financial econometrics and financial mathematical techniques applied in capital market to valuate investment made by investors. Campbell et al.(1997) is an excellent book on a comprehensive overview of financial econometrics. A distinguished feature of the book is that it includes many empirical studies correlates risk and return on investments.

Gouri´eroux and Jasiak (2001) give a concise account on financial econometrics, but some prerequisites are needed. Tsay (2002) is an excellent book on the analysis of time series. It emphasizes on the methodological power of time series techniques on the analysis of financial data.

According to Raju (2004) on stock Market Volatility, an International Comparison examines on Peripatetic stock prices and their volatility, which has now become endemic features of securities markets add to the concern. The growing linkages of national markets in currency, commodity and stock with world markets and existence of common players, have given volatility a new property that of its speedy transmissibility across markets.

Batra (2004) examined the economic significance of changes in the pattern of stock market volatility in India during 1979-2003. Karmakar (2006) measured the volatility of daily stock return in the Indian stock market over the period of 1961 to 2005.

Murinde and Poshakwale (2002) investigated the volatility of Central and Eastern European stock markets and found high volatility persistence, significant asymmetry, lack of relationship between stock market volatility and expected return and non-normality of the return distribution to be the basic characteristics of stock market volatility in those countries.

Gregory (1996) used EGRACH model to examine how volatility and find that bad news increased volatility more than good news and the degree of asymmetry was higher for futures market.

**OBJECTIVES OF STUDY:** The present study examines the 200 investors opinions and also analyse the last ten year's market capitalization of Bse Sensex with help of financial econometric technique ARIMA (Auto Regressive Integrated Moving Average).

1. To Study the investment pattern of the investors in capital market

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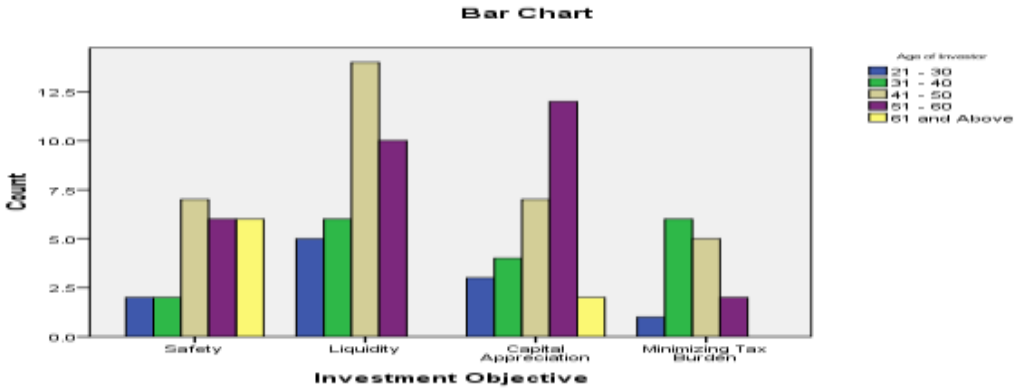
2. To evaluate the market capitalization using financial econometrics and mathematical techniques
3. To determine the factor influencing investors to made investments in capital market

**Data Analysis:** The present research paper considers the both primary data and secondary data for making analysis, Primary data is collected from hundred selected investors from BSE Index and secondary data is collected from reports of BSE Index.

**DEMOGRAPHIC FACTOR ANALYSIS OF INVESTORS:**

| Investment Objective | Age of Investor (in Years) | | | | | Total |
|---|---|---|---|---|---|---|
| | 21 - 30 | 31 - 40 | 41 - 50 | 51 - 60 | 61 and Above | |
| Safety | 2 | 2 | 7 | 6 | 6 | 23 |
| Liquidity | 5 | 6 | 14 | 10 | 0 | 35 |
| Capital Appreciation | 3 | 4 | 7 | 12 | 2 | 28 |
| Minimizing Tax Burden | 1 | 6 | 5 | 2 | 0 | 14 |
| **Total** | **11** | **18** | **33** | **30** | **8** | **100** |

The above table states the demographic characteristics of investors considered for research, the table shows the majority of the investors are preferring to invest their money in capital market for the purpose of high liquidity and marketability. Safety is the investors second priority objective for investors and it is also observed 28% investors investing their money for the purpose of capital appreciation, very few investors i.e., 14% of investors preferring to invest their money for the purpose of minimizing their tax burden.




| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | Age of Investor[a] | . | Enter |

a. All requested variables entered.

b. Dependent Variable: Investment Objective

**Model Summary[b]**

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| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .183[a] | .034 | .024 | .974 | .034 | 3.407 | 1 | 98 | .068 |

**a. Regression Analysis on Investment Objectives of Investors:**

a. Predictors: (Constant), Age of investor

b. Dependent Variable: Investment Objective

**Interpretation:** The above table indicates the investment objectives and its relation to the age of investors, the adjusted R square value is arrived ad 0.034 i.e., the variance observed between the factors age and objectives of investors is 3.4% i.e., the less variance is observed between the objective of investment and age of investors.

**Hypothesis Testing:**

$H_0$: The age is influencing the objectives of Investor

$H_1$: The age is not influencing the objectives of investor

**ANOVA[b]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 3.229 | 1 | 3.229 | 3.407 | .068[a] |
| | Residual | 92.881 | 98 | .948 | | |
| | Total | 96.110 | 99 | | | |

a. Predictors: (Constant), Age of Investor

b. Dependent Variable: Investment Objective

**Interpretation:**The test significance value arrived at 0.068 between age and objectives of investors, here the significance i.e., p > 0.05 it supports strong evidence to accept null hypothesis and the result can be interpreted as the objectives of the investor is not influenced by the age of investor

. **Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 2.824 | .285 | | 9.909 | .000 |
| | Age of Investor | -.162 | .088 | -.183 | -1.846 | .068 |

a. Dependent Variable: Investment Objective

The following regression equation establishes the relation between age and objectives of investors

Investment objective = 2.824 – 0.162(age of investor)

**Time series analysis on Market capitalization of BSE Index:**

| **Year** | **Capitalization(₹ in Cr's)** |
|---|---|
| 2019-2020 | 10455526.00 |
| 2018-2019 | 14002664.79 |
| 2017-2018 | 11984561.18 |
| 2016-2017 | 10176618.44 |
| 2015-2016 | 8221592.92 |
| 2014-2015 | 8887081.32 |
| 2013-2014 | 6367723.79 |

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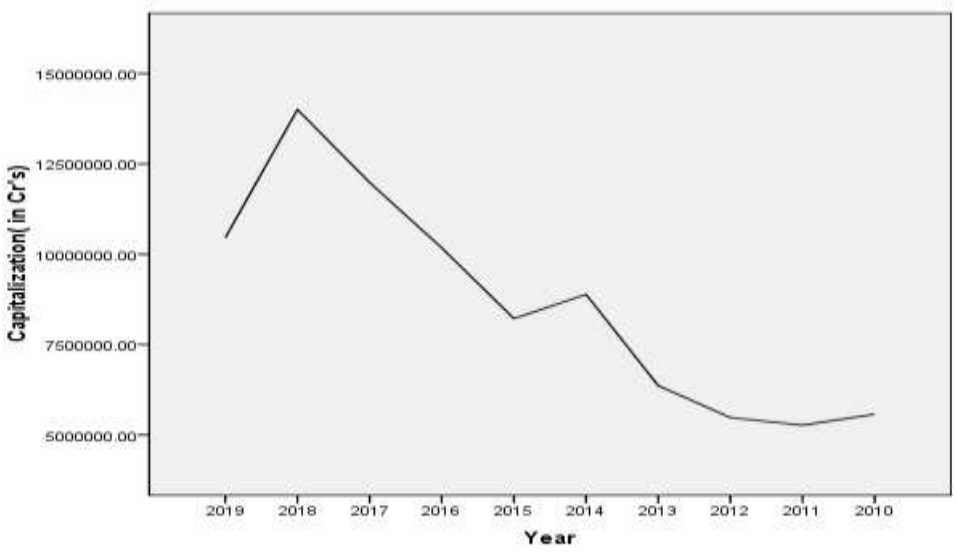
| | |
|---|---|
| 2012-2013 | 5482276.95 |
| 2011-2012 | 5272026.26 |
| 2010-2011 | 5574246.51 |

**Graphical Representation of Market Capitalization in Years**




The above is time series analysis graph disclose the overall capitalization of investment made in BSE index, the increase capitalization in last five years encouraging many investors to invest their money in capital market for medium and long run.

## IV. CONCLUSION:

Investment management is key factor in obtaining good returns from the market, the present paper identified different age people are preferring different investment alternatives available in capital market, the study found evaluating the investment value and predicting the investment value can effectively done by the financial econometric and financial mathematical analysis, this process certainly help the investor to act according to market fluctuations and give clear understanding about their risk and return on investment. It is recommending investors should analyse their investment by using financial econometric techniques will get aware of future market uncertainty and helps them to choose better diversification options to avoid loss on their investment.

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