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Analysis of Financial Econometrics and Financial Mathematical Techniques in Capital Markets

M. Radhakrishna

Research Scholar, Osmania University, Hyderabad,INDIA

A B S T R A C T

Financial econometrics are the important tools uses in financial markets, these tools are helps the investors to assess the risk and returns in their investments. Financial econometric and Financial mathematical techniques are widely used in investments made in capital markets. Capital markets are the place where investors pooled their large amount of investments for better returns and capital appreciation. It is recognized that the investment made in capital markets are subject to market risk. The estimation of risk is key factor for investor before investing their savings in capital market. The financial econometric techniques will give certainty to the investors about their risk involved in capital markets.The present study analyzed risk and return patterns of investors using financial econometrics and financial mathematical analysis and the study also focused on measure to avoid risk according to market fluctuations.

Keywords: Financial Econometrics, Investment, Risk, Return and Capital Markets.

1. Introduction

The Economist's Dictionary of Economics defines Econometrics as "The setting up of mathematical models describing mathematical models describing economic relationships (such as that the quantity demanded of a good is dependent positively on income and negatively on price), testing the validity of such hypotheses and estimating the parameters in order to obtain a measure of the strengths of the influences of the different independent variables." Econometrics is a set of statistical tools that allows economists to test hypotheses using really world data. Financial econometrics has been defined as the application of statistical techniques to problems in finance. People working in the finance industry or researching the finance sector often use econometric techniques in a range of activities – for example, in support of portfolio management, risk management and in the analysis of securities.

2. History and Background study of Econometrics

After the years of relative neglect in academic circles, portfolio choice problems are again at the forefront of financial research. The economic theory underlying an investor's optimal portfolio choice, pioneered by Markowitz 1952, Merton 1969, Samuelson 1969 and Fama 1970 is by now well understood. The general focus of the current academic research is to identify key aspect of real world portfolio choice problems and to understand qualitatively as well as quantitatively their 4role in the optimal investment decisions of individuals and institutions.

3. Overview of Capital Markets

Economic environment of a nation is largely characterized by the efficient mobilization and usage of financial resources. A favorable economic environment attracts investments, which in turn influences the development of the economy. The quantity and quality of assets in a nation at a specific

* *Corresponding author.*
E-mail address: radhakrishna.apps@gmail.com

time is one of the essential criteria for the assessment of economic development. Assets in an economy is broadly divided according to their characteristics into Physical, Financial and intangible assets. Financial assets help the physical assets to generate activity. Financial assets have specific properties like monetary value, divisibility, convertibility, reversibility, liquidity and cash flow that distinguish it from physical assets. These properties of financial asset led to the emergence of financial markets. Specific financial markets are evolved to cater to the unique needs of the financial instruments introduced.

4. Capital Market in India

Transfer of resources from those with idle resources to others who have a productive need for them is perhaps most efficiently achieved through the capital market. Thus, capital market provides channels for reallocation of savings to investments and entrepreneurship and thereby decouples these two activities. As a result, the savers and investors are not constrained by their individual abilities, but by the economy's abilities to invest and save respectively, which inevitably enhances savings and investment in the economy. 87 The existence of Indian capital markets dates back to the 18th century when the securities of the East India Company were traded in Mumbai and Kolkata. When the American Civil War began, the opening of the Suez Canal during the 1860s led to a tremendous increase in exports to the United Kingdom and United States. Several companies were formed during this period and many banks came to the fore to handle the finances relating to these trades. With many of these registered under the British Companies Act, the Stock Exchange, Mumbai, came into existence in 1875. It was an unincorporated body of stockbrokers, which started doing business in the city under a banyan tree. Business was essentially confined to company owners and brokers, with very little interest evinced by the general public. There had been much fluctuation in the stock market on account of the American war and the battles in Europe. However, the orderly growth of the capital market began with the setting up of The Stock Exchange, Bombay in July 1875 and Ahmadabad Stock Exchange in 1894. Eventually, 22 other Exchanges in various cities sprang up. Sir Pharoses Jeejeebhoy was another who dominated the stock market scene from 1946 to 1980. His word was law and he had a great deal of influence over both brokers and the government. He was a good regulator and many crises were averted due to his wisdom and practicality. The BSE building, icon of the Indian capital markets, is called PJ Tower in his memory. The planning process started in India in 1951, with importance being given to the formation of institutions and markets. The Securities Contract Regulation Act 1956 became the parent regulation after the Indian Contract Act 1872, a basic law to be followed by security markets in India. To regulate the issue of share prices, the Controller of Capital Issues Act (CCI) was passed in 1947. The stock markets have had many turbulent times in the last 140 years of their existence. The imposition of wealth and expenditure tax in 1957 by Mr. T.T. Krishnamachari, the then finance minister, led to a huge fall in the markets. The dividend freezes and tax on bonus issues in 1958-59 also had a negative impact. War with China in 1962 was another memorably bad year, with the resultant shortages increasing prices all round. This led to a ban on forward trading in commodity 88 markets in 1966, which was again a very bad period, together with the introduction of the Gold Control Act in 1963. The markets have witnessed several golden times too. Retail investors began participating in the stock markets in a small way with the dilution of the FERA in 1978. Multinational companies, with operations in India, were forced to reduce foreign shareholding to below a certain percentage, which led to a compulsory sale of shares or issuance of fresh stock. Indian investors, who applied for these shares, encountered a real lottery because those were the days when the CCI decided the price at which the shares could be issued.

5. Literature Review

A literature review surveys scholarly articles, books and other sources relevant to particular review surveys scholarly articles, books and other sources relevant to particular issue, area or research, or theory, providing a description, summary and critical evaluation of each work. India has a rich tradition of building economy-wide quantitative models. Indian Macro-Econometric Models are rich in content, by any standards. Krishnamurty (2002) [2] provides an excellent summary of Indian Macro-econometric Models. Indian researchers also made team-efforts to build and maintain models for India. Two such teams are the IEG-DSE Research Team (May 1995) and the IEG-CPB-IPC Research Team (1997).

One of the latest available reports based on the CDE-DSE-IEG Model for India is the "India Link - Fall Forecast, October 2008" (Bhanumurthy and Kumawat, 2008)[3]. Model for Economic Policy making in India. In this context, it needs be mentioned that Indian Planners have used such integrated models in their multifarious exercises. A typical example is the mathematical scaffolding of the Technical Note to India's Fifth and Eighth Five-Year Plans (GOI 1973, 1995). The need of the hour is to revive that tradition and carry it forward.

A paper by Yano and Kosaka (2003) aims at analyzing exchange rates and trade patterns of Indonesia, Malaysia, the Philippines, Thailand, China, Korea, Singapore, and Taiwan in relation to Japan and the United States, with reference to the Asian currency crises in 1997. In order to analyze these issues, they constructed an international Input-Output model linked with Macro-econometric models of the ten countries/regions. The use of the Input-output Table in a Macro-econometric model ensures that the supply side has not been neglected since both the intermediate and final demand encompass demand for capital goods and other factors of production (Klein, 1965). Shah and Thomas (2003) review the changes which took place on India'sequityanddebtmarketsinthedecadeofthe1990s.This has focused on the importance of crises as a mechanism for obtaining reforms.

[2] Report Submitted by Krishnamurthy in 2002

[3] Article published by Bhanumurthy and Kumawat, 2008

Shah(1999)[4]describes the financial sector reforms in India as an attempt at developing financial markets as an alternative vehicle determining the allocation of capital in the economy. Sinha(1993)[5]commentup on the Indian capital market in general and trading systems in the stock exchanges in particular and suggest that the systems therein are rather antiquated and inefficient, and suffer from major weakness and malpractices. According to most of these studies, significant reforms are required if the stock exchanges are to be geared upto the envisaged growth in the Indian capital market.
Shirai(2004)[6]examines the impact of financial and capital market reforms on corporate finance in India. India's financial and capital market reforms incetheearly1990 shave a positive impact on both the banking sector and capital markets.

6. Objectives

The following are the objectives used to analyzed to assess risk and returns of the investors on their investments made in capital markets.

1. To Identify the risk involved in Capital markets Investments
2. To estimate the risk and returns of Investors by using financial econometrics techniques
3. To assess the impact of financial econometrics techniques in measuring risk and returns of investments

7. Data Analysis

The present study analyzed risk and return patterns of the selected hundred number investors using financial econometric and financial mathematical techniques which are efficiently used in capital markets. To assess the risk of investors by considering his expected return the linear regression analysis is used and interpreted in present data analysis considered for research.

7.1 Demograhic Factor Anlaysis of Investors:

Analysis based on Gender:
Gender of Investor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	70	70.0	70.0	70.0
	Female	30	30.0	30.0	100.0
	Total	100	100.0	100.0	

Hundred number of investors are randomly selected for conducting research analysis and it is found 70% of investors are male and remaining 30% investors are female.

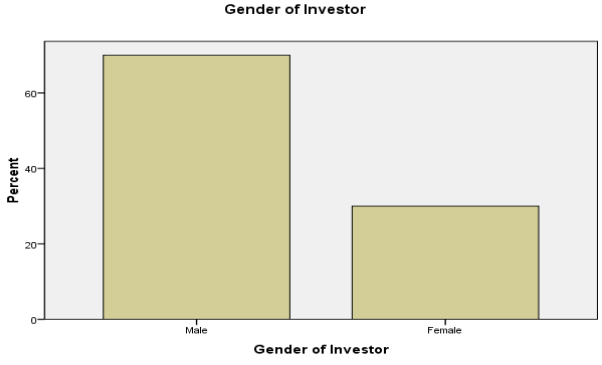

Fig 1. Analysis on Risk Bearing Capacity of Investor:

[4] Report submitted by shah in 1999
[5] Sinha report on Indian capital markets
[6] Article 5by Srirai in 2004

Risk of Investor (in %)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 5	24	24.0	24.0	24.0
	6 - 10	20	20.0	20.0	44.0
	11 - 15	26	26.0	26.0	70.0
	16 - 20	15	15.0	15.0	85.0
	21 and above	15	15.0	15.0	100.0
	Total	100	100.0	100.0	

The above is the table highlight the percentage of risk where investors are likely to bear for their investments made in capital markets, it is found the majority of the investors are willing to take risk between 10 – 15% on their investments followed by 0 – 5%. A significant number of investor are ready to take between 16 – 20% and 20% and above.

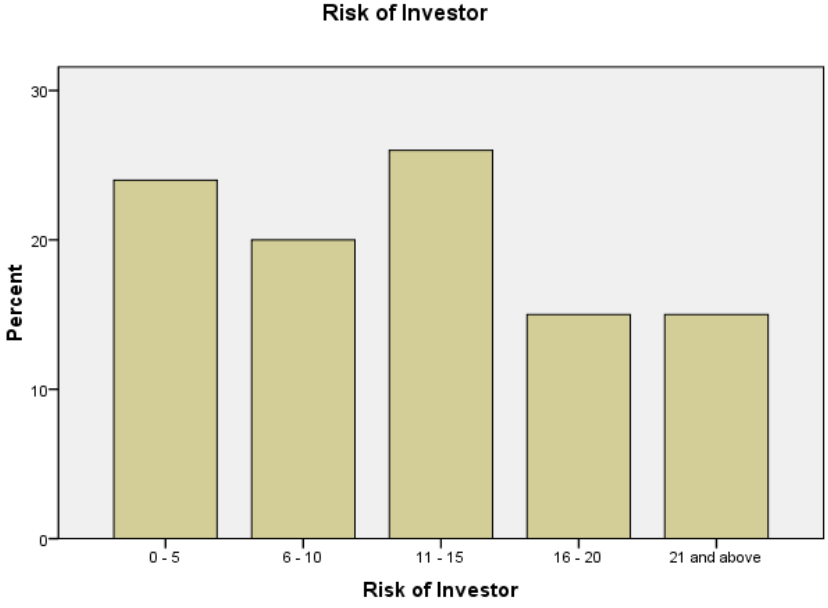

Fig 2. Risk of Investor

Expected return of Investor (%)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 10	19	19.0	19.0	19.0
	11 - 20	21	21.0	21.0	40.0
	21 - 30	18	18.0	18.0	58.0
	31 - 40	20	20.0	20.0	78.0
	40 and above	22	22.0	22.0	100.0
	Total	100	100.0	100.0	

From the above majority of investors are expecting 40% and above return on their investments made in capital markets. It is observed that very less investors are expecting lower returns i.e., less than 20% on their investments. 21% investors are expecting returns between 11 -20% on their investments, 18% investors are expecting 21 – 30% and 20% are expecting 31 -40% expecting returns on their investments.

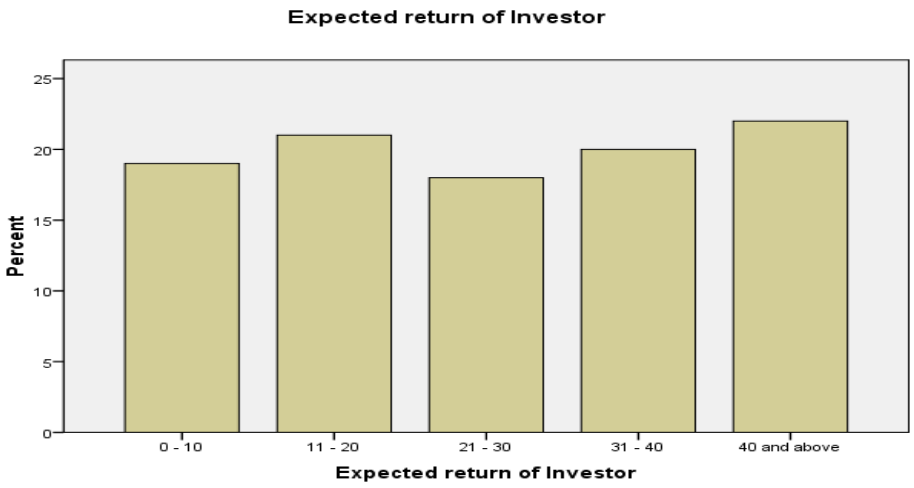

Fig 3 Expecting Returns on the Investor

7.2 Linear Regression Analysis to Assess Risk of an Investor:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Type of Investor, Experience in Capital market, Expected return of Investor, Gender of Investor[a]	.	Enter

a. All requested variables entered.

b. b. Dependent Variable: Risk of Investor

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.263[a]	.069	.030	1.349	.069	1.759	4	95	.144	1.958

a. Predictors: (Constant), Type of Investor, Experience in Capital market, Expected return of Investor, Gender of Investor

b. Dependent Variable: Risk of Investor

Interpretation: From the above summary of test statistics the adjusted R square is observed is 0.03 i.e., the variance between the selected variables is arriving approximately 3%, The observed R value is 0.263 i.e., the relation between independent and dependent variables is approximately 26.3%.

Hypothesis Testing:

H_0: The risk of investor is not influenced by the gender, experience, investor type and returns

H1: The risk of investor is influenced by the gender, experience, investor type and returns

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.804	4	3.201	1.759	.144[a]
	Residual	172.906	95	1.820		
	Total	185.710	99			

a. Predictors: (Constant), Type of Investor, Experience in Capital market, Expected return of Investor, Gender of Investor

b. Dependent Variable: Risk of Investor

Interpretation: The above anova test significance value arrived at 0.144 i.e., $p > 0.05$, here the alternative hypothesis is rejected and result can be interpreted as the risk of investor is not influenced by the factors like gender, experience, type of investor and returns expected.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.491	.675		2.208	.030
	Experience in Capital market	.229	.165	.138	1.387	.169
	Gender of Investor	.576	.300	.194	1.919	.058
	Expected return of Investor	.117	.096	.122	1.218	.226
	Type of Investor	-.190	.274	-.070	-.691	.491

a. Dependent Variable: Risk of Investor

The above coefficients table establishes the relation between dependent variable and independent variable and it estimates the risk taking capacity of the investor based on investments made in capital markets. The following is the formula identified to assess the risk factor of investor using econometric technique called linear regression.

Risk = 1.491 + 0.229(experience in capita market) + 0.576(Gender code of investor) + 0.117(expected return of investor) – 0.19(Type of investor code)
The above is formula adopted for assessing risk of the investor considered for study, from the derived problem it is observed that there is a positive correlation existed between the variable considered for study.

Graph representing risk of the investor:

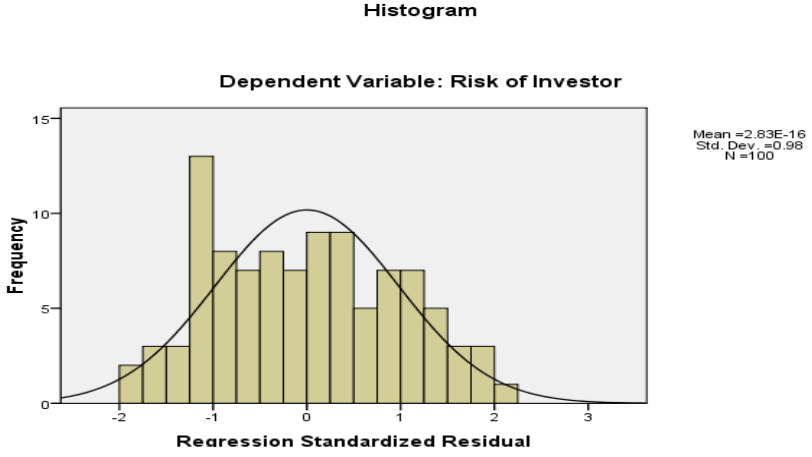

Fig 4. Regression Standardized Residual

8. Conclusion

Capital market investments are effective financial instruments involved in high risk based on market conditions, the assessment of risk is very important for investor to know the position of investment in market, in this the financial econometric and mathematical analysis is very important for investor to predict the returns of the investor. It is found from the following study by using tools of the financial econometrics that the investor risk not influenced by the gender, experience and expected returns of an investors, and this analysis helps the investor to monitor his investment and suggests suitable diversification of investment according to market fluctuations. The present study recommends the investor to do technical analysis using financial econometric techniques before investing their savings in capital markets.

REFERENCES

Texts

1. Financial Risk Modeling and Portfolio Optimization with R (statistics in Practice) by Bernhard Pfaff
2. IIM Ahmadabad Business books: day to day Economics
3. The Econometrics of Financial Markets (2007) by A. Craigmackinlay

Reports

a. SEBI Annual Reports
b. Planning commission report on Financial Markets in India.

Web sources

1. www.rbi.gov.in
2. www.sidbi.gov.in
3. www.google.com
4. www.forex.com