

Fuzzy Rule Based System to Characterize the Decision Making Process in Share Market

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ABSTRACT

This research work will help the customer for decision making in share market, based on fuzzy rule based system. Past performance data could be used to overcome uncertainty, vagueness and imprecision of share market. Six factors which are affecting the share prices are Market Growth, Monsoon Policy/Political Foreign Investment, Ratio Analysis and Agent Activity are very helpful to take market share price decision. Technical and fundamental approaches are used in parallel to estimate short-term and long-term return and risk. The customer will more secure to take risk at time of share trading, Fuzzy Logic framework is developed to carry out the required analysis for arriving at the governance rating of the firms.

Keywords- Market growth, share price, fuzzy logic.

I. INTRODUCTION

Stock market is an important pillar of each economy. Share is the Ownership of the company divided into small parts and each part is called as Share or Stock. A stock exchange is a corporation or mutual organization which provides "trading" facilities for stock brokers and traders, to trade stocks and other securities. A trader who is looking to profit from the market has to have faith on the company where he is putting his money. Technical analysis uses price and other similar daily input data, and the fundamental analysts use fundamental data which are normally published on an annual basis or quarterly.

This paper explores the possibility of applying fuzzy logic theory for handling vagueness and imprecision that characterize the decision making

process. Fuzzy Logic framework is developed to carry out the required analysis for arriving at the governance rating of the firms. This research work will help the customer for decision making in share market. A person carrying a share of a company holds that part of ownership in that company. Share is nothing but the Ownership of the company divided into small parts and each part is called as Share or Stock. Buy-Back is a corporate action in which a company buys back its shares from the existing shareholders usually at a price higher than market price. When it buys back, the number of shares outstanding in the market reduces and hence the market capitalization as per below relation:

Market capitalization = Market value * Number of shares outstanding

Companies also go for buyback with **intent of projecting better financial ratios** as indicated below:

Earnings per share (EPS) =

Earnings / Shares outstanding

Since outstanding shares reduce, the company's earnings are now divided amongst less number of shares for calculating EPS value. From investor's point of view, higher the earnings per share, better it is as an investment option.

Share market is the place where buying and selling of shares takes place. The buying and selling of shares takes place from anywhere wherever with the

help of internet connected computer. One should need the demat account, computer and internet connection and he/she can start the share trading or investing. When you place the buy order, the message is transferred to the exchange [either NSE {National Stock Exchange} or BSE {Bombay Stock Exchange}] and the order stays in the queue of exchange's other orders and gets executed if the price of that share comes to that value. Once you get the confirmation of this transaction, the shares purchased, will be sent to your demat account. The shares will be stored in demat account in electronic format. The Sensex is an "index". An index is basically an indicator. It gives you a general idea about whether most of the stocks have gone up or most of the stocks have gone down. In India the Sensex is an indicator of all the major companies of the BSE and the Nifty is an indicator of all the major companies of the NSE. If the Sensex goes up, it means that the prices of the stocks of most of the major companies on the BSE have gone up. If the Sensex goes down, this tells you that the stock price of most of the major stocks on the BSE have gone down. The Sensex represents the top stocks of the BSE and the Nifty represents the top stocks of the NSE. Besides Sensex and the Nifty there are many other indexes. Many different types of investors hold the shares of a company. Fig.1 shows BSE and NSE data on 3 august 2010.

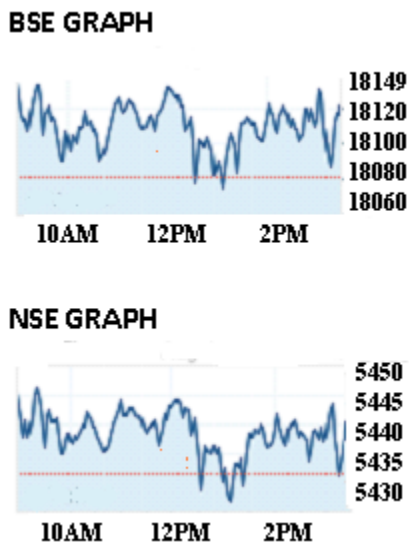


Fig.1 BSE and NSE graph (date- 3Aug.2010)

II. DIFFERENT FACTORS AFFECTING SHARE MARKET

There are six main factors which affect the share market :

1. Market growth: A fast growing market is generally considered attractive, and pulls a lot of organisation's resources in an effort to increase gains. A case in point is the technological market widely consider by experts as a fast growing market, and tends to attract a lot of competition.

The strength of this growth in the stock market has been corporate earnings. When a company says there is "strong market growth", they mean that the overall demand for the product they are selling has increased. The positive market growth has also improved the overall standard of living of the people in the country. India market growth looks optimistic and bright in the recent years to come. The service sector contributes around 54% of the annual Gross Domestic Product while the share of the industrial and agricultural sectors is 29% and 17% respectively. India is steadily becoming one of the global business giants with its booming market scenario.

2. Monsoon: The "monsoon effect" does have an impact on demand for fertilizers and tractors, and to a lesser extent, two-wheelers and consumer durables. The spatial distribution of the monsoon appears to wield a greater influence on sales growth rates, than does the absolute quantum of rainfall in a year. About 60% of Indian Agriculture is monsoon dependent. With rainfall this time being deficient by 45%, the agriculture sector has been hit hard. If monsoon showing no sign of rain, the rural income is bound to decrease, this eventually will affect the organization's plans and economic conditions. If the monsoon situation does not improve, it could result in downgrading of GDP growth estimates, downgrading corporate earnings estimates, a fall in the premium given to Indian markets and a consequent fall in Indices and stock market.

3. Policy/ Political Impact: After independence the development of India's economy was based on socialist-inspired policies. These policies like "Licence Raj" and others to protect from the world markets. The political Economy of India is rapidly changed with the liberalization of the economy in the 1990's. It has now moved towards a market based system and is the world's second fastest growing

major economy after China. India recorded the highest GDP growth rate of 9% in 2007.

SEBI, the country's stock market regulator: Only eight stock exchanges enjoy "permanent" recognition from the Securities and Exchange Board of India (SEBI) out of a total of 24 equity bourses in the country. These "permanent" bourses include Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) -- the two stock exchanges synonymous with the Indian equity market. Other bourses that have been granted 'permanent' status by the regulator include Ahmadabad Stock Exchange, Bangalore Stock Exchange, Calcutta Stock Exchange, Madhya Pradesh Stock Exchange, Madras Stock Exchange and Delhi Stock Exchange (DSE).

While presenting the Budget for 1992-93, the Finance Minister had announced a decision to allow reputed foreign investors, such as Pension Funds etc., to invest in India capital market. To operationalise this policy announcement, it has become necessary to evolve guidelines for such investments by Foreign Institutional Investors (FIIs). For granting registration to the FII, SEBI shall take into account the track record of the FII, its professional competence, financial soundness, experience and such other criteria that may be considered by SEBI to be relevant. Besides, FII seeking initial registration with SEBI shall be required to hold a registration from the Securities Commission, or the regulatory organization for the stock market in the country of domicile/incorporation of the FII.

4. Foreign Investment: The entry of more foreign investors into emerging markets may lead to pressure to upgrade trading systems and modify legal systems to support more trading and the introduction of a greater variety of financial instruments. The removal of barriers to foreign investment can improve the operation of domestic capital markets.

5. Ratio Analysis : Ratio Analysis is the hart of financial analysis, which shows the economic condition of business. The aim of ratio analysis is to find out relative study, conciseness, and analysis of business activities.

Financial ratio are useful because they summarise briefly the results of detailed and complicated

computations for a company. On the basis of purpose the financial ratio has four major types. Liquidity Ratio, Leverage Ratios, Activities Ratios, Profitability Ratios.

6. Agent activities: Indian stock exchange allows a member broker/agent to perform some activities. Act as an agent to Buy or Sell share/securities for their clients and charge commission for the same.

Now take the six factors with their performance during the past 6 year values of a computer software company

TABLE 1

Different categories	Very Poor	Poor	Satisfactory	Fair	Good	Very Good
Ranges	<05	05-20	20-40	40-60	60-80	80-100

On the basis of past year resulting values of any share we can quantify the grade of each level acquiring various investment categories by representing percentile of each one with a segment graded from 0 to 1.

TABLE 2

Year	MG	MO	PO	FI	RA	AG
2004	0.6	0.41	0.31	0.36	0.41	0.6
2005	0.73	0.92	0.62	0.41	0.6	0.31
2006	0.60	0.72	0.72	0.31	0.5	0.5
2007	0.12	0.70	0.50	0.70	0.70	0.30
2008	0.70	0.50	0.12	0.70	0.70	0.70
2009	0.50	0.50	0.30	0.12	0.70	0.70

In table 2, the entries of that table should be obtained by percentile average like $[(20+40)/200 + (60+80)/200] / 2 = 0.5$.

In Fig.2 shown the chart for different values of MG, MO, PO, FI, RA AND AG with respect to year of performance between 2004 to 2009.

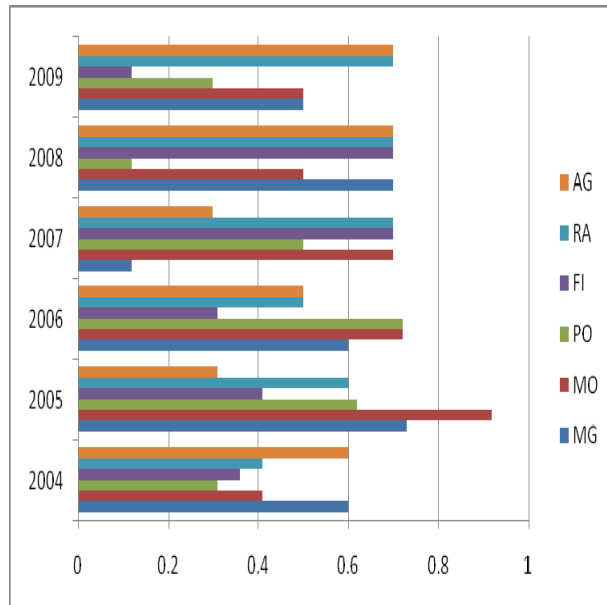


Fig.2 Chart for different values of MG,MO,PO,FI,RA AND AG with respect to year of performance.

III. FUZZY CONTROLLER

Figure 3 gives the structure of a fuzzy controller, which is essentially the structure of a Mamdani technical fuzzy controller. Trend in prices information is the Crisp input which is fuzzified to mapped on fuzzy sets. We evaluate stock price and the trend in prices over some period of time and then decide whether to trade based on simple rules. The result is in each case a real number in the interval [01].

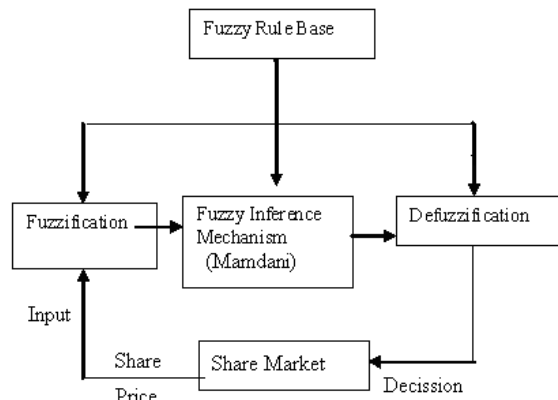


Fig.3 Fuzzy Controller

In Fig.4 shows the Fuzzy Inputs and out puts of FIS editor for mamdani fuzzy controller

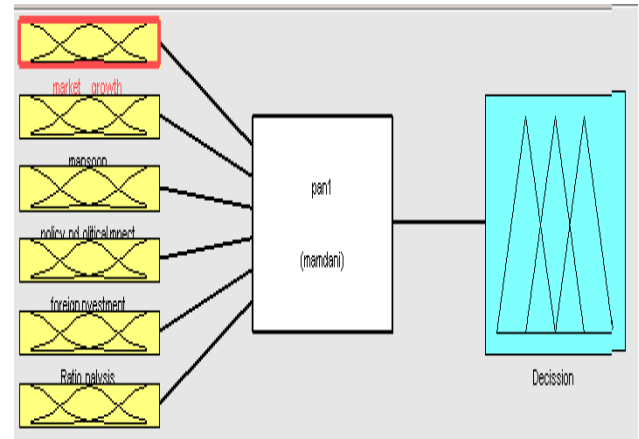


Fig.4 Fuzzy Inputs and out puts of FIS editor for mamdani fuzzy controller

A. Fuzzy Rules

Rule1:-

If (market_ growth is low) and (monsoon is low) and (policy_ and_ political impact is low) and (foreign_ investment is low) and (ratio_ analysis is low) and (agent_ activities is low) then (Decision is hold).

Rule2:-

If (market_ growth is medium) and (monsoon is medium) and (policy_ and_ political impact is low) and (foreign_ investment is low) and (ratio_ analysis is medium) and (agent_ activities is low) then (Decision is hold).

Rule3:-

If (market_ growth is medium) and (monsoon is high) and (policy_ and_ political impact is high) and (foreign_ investment is low) and (ratio_ analysis is medium) and (agent_ activities is medium) then (Decision is purchase).

Rule4:-

If (market_ growth is high) and (monsoon is high) and (policy_ and_ political impact is high) and (foreign_ investment is high) and (ratio_ analysis is medium) and (agent_ activities is medium) then (Decision is purchase).

Rule5:-

If (market_ growth is high) and (monsoon is medium) and (policy_ and_ political impact is high) and (foreign_ investment is medium) and (ratio_ analysis is high) and (agent_ activities is medium) then (Decision is purchase).

Rule6:-

If (market_ growth is high) and (monsoon is low) and (policy_ and_ political impact is high) and (foreign_ investment is high) and (ratio_ analysis is high) and (agent_ activities is high) then (Decision is purchase).

Rule7:-

If (market_ growth is high) and (monsoon is medium) and (policy_ and_ political impact is medium) and (foreign_ investment is medium) and (ratio_ analysis is medium) and (agent_ activities is high) then (Decision is purchase).

Rule8:-

If (market_ growth is medium) and (monsoon is high) and (policy_ and_ political impact is high) and (foreign_ investment is high) and (ratio_ analysis is high) and (agent_ activities is high) then (Decision is purchase).

Rule9:-

If (market_ growth is low) and (monsoon is low) and (policy_ and_ political impact is low) and (foreign_ investment is low) and (ratio_ analysis is medium) and (agent_ activities is medium) then (Decision is sell).

Rule10:-

If (market_ growth is low) and (monsoon is medium) and (policy_ and_ political impact is medium) and (foreign_ investment is high) and (ratio_ analysis is high) and (agent_ activities is high) then (Decision is sell).

Rule11:-

If (market_ growth is high) and (monsoon is medium) and (policy_ and_ political impact is high) and (foreign_ investment is high) and (ratio_ analysis

is high) and (agent_ activities is high) then (Decision is purchase).

Rule12:-

If (market_ growth is high) and (monsoon is low) and (policy_ and_ political impact is high) and (foreign_ investment is high) and (ratio_ analysis is medium) and (agent_ activities is medium) then (Decision is purchase).

Rule13:-

If (market_ growth is low) and (monsoon is low) and (policy_ and_ political impact is medium) and (foreign_ investment is medium) and (ratio_ analysis is medium) and (agent_ activities is medium) then (Decision is hold).

B Rule Viewer

MAT LAB is used to draw surface diagram and rule viewer.

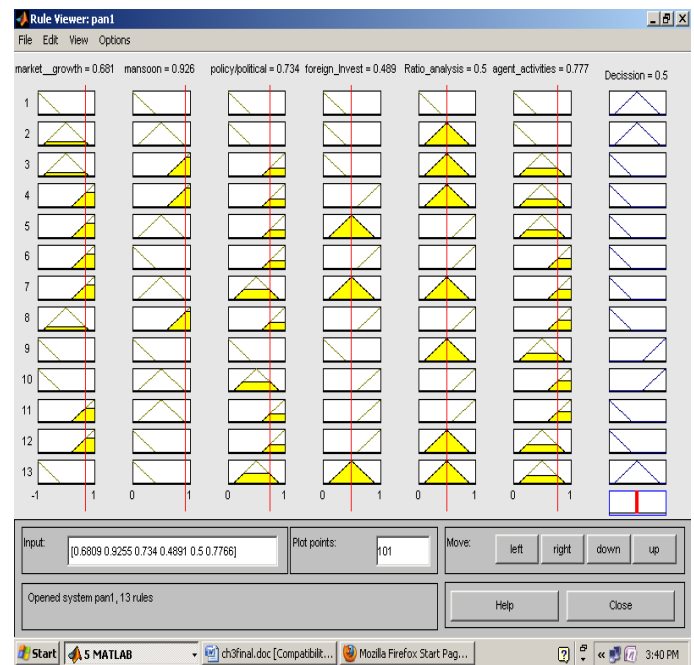


Fig.5 Rule Viewer

C. Surface View

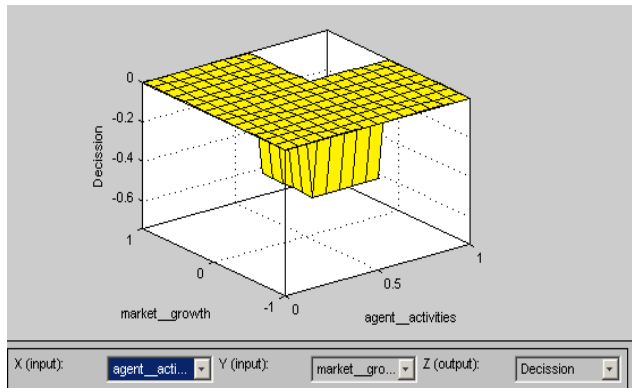


Fig.6(a) Surface view for agent activities is on X-axis and market growth is on Y-axis and decision on Z- axis.

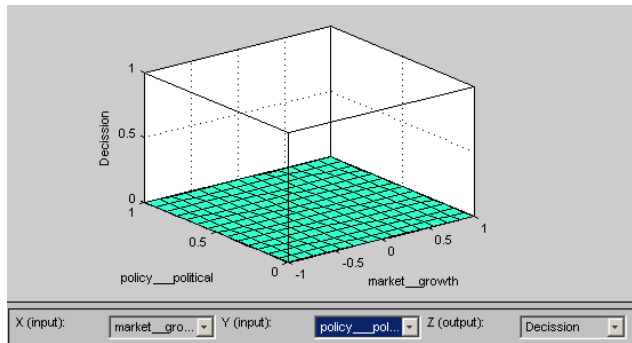


Fig.6 (b) Surface view for market growth is on X-axis and policy and political impact on Y- axis and decision is on Z axis.

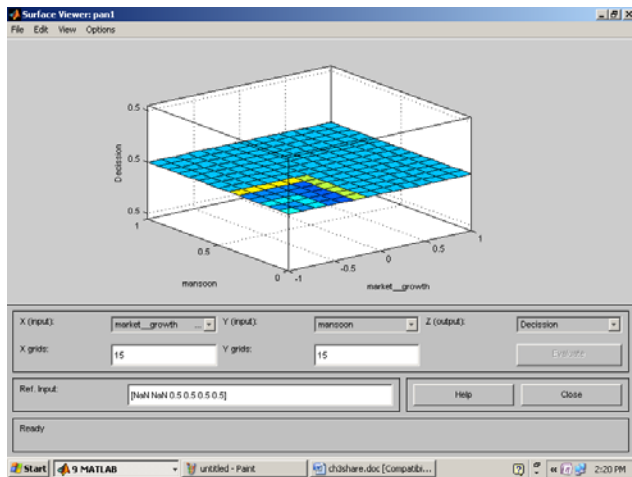


Fig.6(c) Surface view for market growth is on X-axis and monsoon is on Y- axis and decision is on Z axis.

D. Simulation Graph

In fig.7 shown the simulation results between time interval 0 to 100.

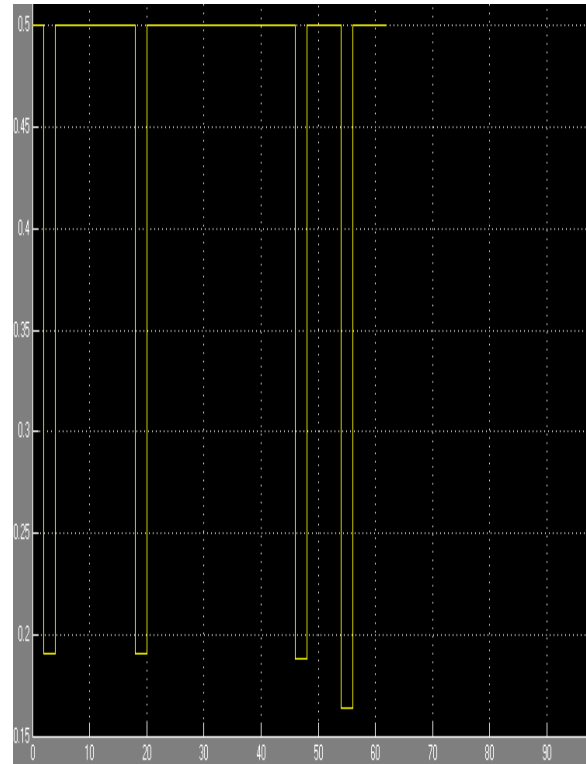


Fig. 7 Simulation results for time interval 0 to 100.

IV. CONCLUSIONS

This research work will help the customer for decision making in share market. Furthermore, based on fuzzy rule based system stock exchange data could be used to overcome uncertainty , vagueness and imprecision of share market. Technical and fundamental approaches are used in parallel to estimate short-term and long-term return and risk. The customer will more secure to take risk at time of share trading. The computational results show the portfolio rebalancing model with a appropriate membership function according to the investor's degree of satisfaction. Six factors which are affecting the share prices are Market Growth, Monsoon Policy/Political Foreign Investment, Ratio Analysis and Agent Activity are very helpful to take market share price decision.

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