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Common funds investment portfolio optimization with fuzzy approach

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Abstract

Conventional portfolio optimization models assume that future of the Stock Market will be predicted by past data. However, regardless of whether how accurate is the past data, this theorem in financial market is not applicable due to the high volatility of the market environment. This research is about optimization problem of fuzzy set that shows the assets return by fuzzy data. Part of the data of the actual financial information, are information from the actual data of Years 2012 and 2013 that have been obtained as fragile (and final) and another part of the survey experts as predictive information was obtained for the years 2014 to 2017 in the form of triangular fuzzy numbers. To optimize portfolio, nonlinear mathematical models for some were specified and presented then using the change of variables technique that in operations research literature is a simple technique, two models could merged and integer linear model variables were created and the results were used to calculate the software Lingo. Finally the results were obtained in accordance with a basics idea of financial economics that whatever the degree of investment risk, is more he want to get more return.

Keywords: Return; risk; common investment fund; triangular fuzzy number; fuzzy model; fuzzy data

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1. Introduction

Financial problems in recent years, has been the subject of many investigations. Portfolio theory states that: everyone assets and investments should be portfolio (diversification).Namely instead of investing in an asset, portfolio risk can be minimized with portfolio investment. So portfolio selection is a vital activity in all organizations for complex processes in the different case and sometimes contradictory. (Lin &Hesy 2004) Among financial
Scenarios investment funds is proposed as one of the most popular financial strategies. (Chang 2010) investment funds are financial intermediaries that collect the financial resources for individuals and companies and investing in diversified portfolio of securities. Although joint investment fund industry in Iran begins with a multi-ten-year delay but were established with warm reception from investors in 2007. (Roshangarzadeh Amin, Ahmadi, Mohammad Ramadan). The main goal of investors is gaining more return on acceptable risk level. Accordingly, whatever Investor can predict better increased the future returns. Forecasting future returns of mutual funds has particular importance for Investors. (Astronomer, 2009).Fund portfolio optimization is very important point, In addition to investing in the Fund. So that to have the greatest benefit with the least possible risk for Investors. The Majority of studies that have been done so far in the portfolio selection is based on Markowitz approach and He proposed a mathematical model which is based on the mean-variance. Due to the lack of adequate mathematical models of hard or firm, on the cover of uncertainty, Complexity and ambiguity or concepts and inaccurate variables, Using the principles and methods of fuzzy becomes necessary. (Elton &Gaber 1995) in a real environment, Unreliability in the trends in market and inability to meet it, can be followed by very detrimental effects. To address some vague information in Zadeh decision-making, (Zadeh 1965) introduced the concept phase.

2. Conceptual Model

Assume that we have n property for Investment and M 0 is a Part of the available total budget that should be in each box to be invested and j=1,2,…,n⸴X_j represents the invested dollar amount that is in j fund. table 1 illustrates the limitation and equation 1 to 31 prove the conceptual model.

Table 1. Our Limitation

The introduction of variable	Variable name
Random variable that Shows the rate of return on j asset	R_j
The high level of investment on j asset	U_j
Expected return j asset	r_j
Total funds available	M_0
Return	R_0
The ratio of total capital that Invested in j	X_j
Have Implying the realization of a R j random variable during the t course	r_{jt}

$$x_j \geq 0 , \sum_{j=1}^{n} x_j = M. \tag{1}$$

Rj Random variable that Shows the rate of return on j asset.The expected return on assetsis displayedin this case:

$$r(x_1, …, x_n)= E[\sum_{j=1}^{n} R_j X_j] = \sum_{j=1}^{n}[R_j]X_j \tag{2}$$

Used to measure the potential risk:

$$\delta(x_1, …, x_n)= \sqrt{E[\sum_{j=1}^{n} R_j X_j] = \sum_{j=1}^{n}[R_j]X_j\}^2]} \tag{3}$$

Portfolio problem is formulated as a quadratic programming problem: