Using genetic algorithm to determine the weight of each constituent share of portfolio

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Abstract: Organizations can choose the appropriate methods for optimum portfolio investor interested in working in the financial markets, especially the second group of investors (people lack information and knowledge) contribute. In this study mean - half of the variance model for the portfolio is used and optimal model using genetic algorithms. For this reason, companies are examined in population in several stages and eventually selected 70 companies as research samples and data are needed (efficiency and risk-quarter) collected for research. As well as to assess Half of the variance Mean- model Markowitz model for portfolio Mean- variance efficient frontier models are used and the results are compared with each other. The results show that the use of genetic algorithm to determine the weight of each component of the portfolio, the formation of the portfolio is optimized.
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Introduction

The two main issues in the discussion of investment risk and return, and in this case there are two important perspectives In which the first investors to bear risk only when they earn additional returns and secondly, the risk is reduced by diversification. Securities with variable yields and the level of volatility is measured by the variance and standard deviation. Decisions about funding are integrated, so that the highest returns in the same risk or low risk at the same efficiency, one of the most complex and Challenging issues of securities and investment analysis. As a result, if possible, taking into account market factors The factors and conditions that cannot be supervised by the investor to choose the appropriate model and optimize the investment in conditions of uncertainty Investment portfolio selection problem can be solved by decision makers to take action.

Literatures

CAPM is the most practical model portfolio. The CAPM predictions about the expected return of risky assets balance is that 12 years after Markowitz simultaneously and independently by Sharp (1964), Lintner (1965) and masin (1966) was developed. Because of the limitations and lack of extended CAPM and CMT on individual securities and inefficient collection and limitations in experimental Sharp in 1963 to explain the sensitivity coefficient (β) as a risk, a single model released its index. CAPM model is a temptation to say that a single index. Is one of the two models, the CAPM is expressed in terms of expected return Risk relationships while single index model is a statistical model to explain the process efficiency. Then people like to go, Buvrmistr, Meckel Roll and Edwin in 1986 and 1988, articles in the multivariate models developed by Chen, Roll and Ross was introduced in 1986, is displayed. In 1986, Solomon and his colleagues designed a model that was used in the seven variables. The results show that the use of Multivariate models can best describe the relationship between historical data and choose the investment portfolio will be better. The main objective of the multi-factor models to find some non-market influences that led to the movement of stock to each other are combined. The covariance's between stock returns from a one-factor model (usually a market index) of lead, while multi-factor model covariance of two or more of the factors are Harry. M. Markowitz in 1952 to select their model portfolio produced. Model mean - variance of Markowitz, the most famous and the most common approach is to invest in a selection problem. Markowitz model of the most outstanding points of interest in considering the risk not only based on the standard deviation of a stock, but is based on the risk of investment. Mean- model Markowitz variance with the fundamental problem is the question of funding. First difficult to estimate the number of parameters and also solve technical problems, including devices with different assumptions, and solve the equation with many unknowns, too.

A multi-criteria decision-making models goal programming (GP) is. Charenz and Cooper for the first time in 1955 published an article on the goal programming. They minimize the sum of absolute deviations from certain destinations studied. The details of this technique was studied by Ajiri later. In 1973, Lee and Larvo first GP model to solve problems in their previous models.

One of the measures is Half of the variance risk adverse. European states with a lower degree of risk aversion function in 1970 such investors, risky assets in low-risk assets has become common due to the

increased demand for higher risk assets and ultimately lead to an increase in investor wealth. Half of the variance benchmark study in 1972 by Hogan and Warren continued. Jory in 2004 two methods to obtain optimal weights investments according to the data used eight New York stock market. These methods include at least the VaR method Mean- variance bound. He concluded that the results of portfolio optimization based on VaR is different from the method of variance Mean- to it (especially for non-normal data) are preferred.

In 2007 Rhib Audio and M. Mancy in an article entitled "Portfolio selection under fuzzy environment using genetic algorithm" to study the optimization of their portfolio and their model tested in the Istanbul Stock Exchange. They aim to minimize the risk function and the degree of desirability considered as a limitation considered. The results of selected performance model portfolio shows the fuzzy environment. In 2008, Hwang's article Half of the variance criteria for measuring risk and the criteria for measuring the efficiency of the fuzzy environment. He also expressed Half of the variance three properties and then using a genetic algorithm to select the best portfolio. The results of his research showed that the algorithm was effective for solving models Mean-Half of the variance in phase.

In Iran raei (2008) in an article entitled "Venture investment portfolio for comparison of neural network and Markowitz 'portfolio optimization problem is funding. In 2008, gholamreza eslami bid goli and ahmad talangy in his article Jointly models to select optimal portfolios studied and they came to the conclusion that the most appropriate framework for portfolio selection, portfolio analysis model is based on multiple criteria techniques. Shah Alizadeh and Memariani (2003) in an article entitled "Portfolio Selection mathematical framework for multiple purposes," to examine the investment portfolio using goal programming began. In our model the proportion of stocks generally are mixed together so that grape seed portfolio returns given the low risk or high risk for certain, have the highest efficiency.

Mousavi Zadeh in 2007 a study on the risk of common stock over a period of three years to determine the portfolio in Tehran Stock Exchange (2002 to 2004) has done.have. Finally, portfolio performance by a portfolio of randomly selected comparison and the results indicate a positive effect on the ratings model stock portfolio is forming. Model mean - variance portfolio Markowitz to form a secondary uses linear programming. However, this model requires complex calculations computer and cannot be resolved easily.

Reza Tehrani and alireza siry mean-variance model of Markowitz Browse mentioned problems, the use of portfolio models to choose Mean- Half of the variance studied and found that the distribution of returns is non normal Mean- model Half of the variance the difference Mean- variance model; and using better Half of the variance Mean- can be selected on the portfolio decisions

The necessity and importance of research

Due to the absence of confidence that Iran's economy and consequently there are in stock, Investors are always faced with the problem that their capital investment in the Share on that are intended to ensure that the future status of stock And achieve their desired profit. Therefore, this study is of particular importance to the portfolio according to risk taking the place of our investor His profit is the maximum. The necessity of this research to help people who do not have sufficient knowledge in the fields of finance, but would like to work in the stock ones.

Research Methodology

Study by decision makers to select the investment portfolio, is carried out. Portfolio Optimization model to model and optimize the GA will be Half of the variance Mean-. This study is based on the purpose of application of the strategy implemented with the aim of facilitating cross because the decision-making process used.

Data

This information and data will be collected both library and field studies. Studies in the library of resources including books and technical articles; Domestic and foreign magazines and other publications related to the topic and also to collect information in the field of data relating to companies listed on Tehran Stock Exchange will be used.

The research used data from 70 companies. Companies are required to collect information about the research study result of the new software is used. In order to perform computational activities packages SPSS and EXCEL and MATLAB software will be used for genetic algorithms.

Society & sample

The study sample consisted of all firms listed in the Tehran Stock Exchange to date is 01/10/2009. Among the companies making up the population, the number of 70 companies selected to be in the end how to choose these companies is presented in detail in Chapter III

Research questions

The basic question raised by this study is that given the uncertainty of the Tehran Stock Exchange, selection of optimal investment portfolio using genetic algorithm optimization method variance will it be?

Data analysis

Descriptive statistics of the studied companies

Descriptive statistics of the studied companies were calculated using each company's quarterly

performance. Table 1 shows the descriptive statistics of the selected companies.

Table 1: Descriptive statistics of the studied companies

Company code	maen	Half Variance	Half a standard deviation	Standard deviation	Variance	Skewness	Elongation
A1	0.1178	0.147821	0.021851	0.29528	0.087	2.603	10.652
A2	0.0706	0.17307	0.029953	0.31540	0.099	1.576	3.479
A3	0.2759	0.342748	0.117476	1.21749	1.482	5.066	28.358
A4	0.0446	0.126146	0.015913	0.19456	0.038	0.489	1.193
A5	0.1018	0.136328	0.018585	0.22527	0.051	0.663	-0.185
A6	0.0870	0.1104	0.012188	0.24760	0.061	3.366	15.647
A7	0.1314	0.173903	0.030242	0.60632	0.368	5.170	29.434
A8	0.1277	0.121674	0.014805	0.34680	0.120	3.540	12.907
A9	0.1073	0.112763	0.012716	0.41643	0.173	5.584	33.350
A10	0.1508	0.174175	0.030337	0.49945	0.249	3.726	16.210
A11	0.2089	0.202136	0.040859	0.70813	0.501	4.495	22.116
A12	0.0463	0.061251	0.003752	0.12489	0.016	1.771	3.446
A13	0.0509	0.098114	0.009626	0.18866	0.036	1.867	6.386
A14	0.0615	0.106855	0.011418	0.15387	0.024	-0.101	0.426
A15	0.1370	0.134228	0.018017	0.22835	0.052	1.122	1.746
A16	0.1008	0.069797	0.004872	0.16507	0.027	2.898	10.087
A17	0.1223	0.132004	0.017425	0.24584	0.060	1.473	2.228
A18	0.1128	0.122231	0.01494	0.23252	0.054	1.854	5.488
A19	0.1036	0.113806	0.012952	0.22109	0.049	1.881	4.350
A20	0.1092	0.121485	0.014759	0.20199	0.041	0.726	-0.308
A21	0.1885	0.272843	0.074443	1.02108	1.043	5.590	33.540
A22	0.0657	0.102963	0.010601	0.24969	0.062	2.952	9.986
A23	0.0743	0.133443	0.017807	0.30812	0.095	2.653	9.622
A24	0.1054	0.141474	0.020015	0.23177	0.054	0.864	2.500
A25	0.1281	0.225463	0.050834	0.50219	0.252	2.414	7.104
A26	0.0455	0.087308	0.007623	0.20039	0.040	3.150	13.457
A27	0.0854	0.11215	0.012578	0.30643	0.094	4.289	22.282
A28	0.1188	0.157206	0.024714	0.27667	0.077	1.040	0.381
A29	0.1385	0.188774	0.035636	0.33809	0.114	1.222	1.473
A30	0.0882	0.130125	0.016932	0.23667	0.056	1.188	1.010
A31	0.1123	0.101765	0.010356	0.23510	0.055	2.442	6.312
A32	0.1146	0.131365	0.017257	0.28992	0.084	2.588	8.954
A33	0.1276	0.139046	0.019334	0.27583	0.076	1.841	4.015
A34	0.1281	0.198243	0.0393	0.36378	0.132	1.477	3.101
A35	0.1020	0.1033	0.010671	0.21303	0.045	1.921	3.889
A36	0.1277	0.157992	0.024961	0.23837	0.057	0.226	-0.009
A37	0.1423	0.203185	0.041284	0.65586	0.430	4.307	21.070
A38	0.1051	0.084436	0.007129	0.17026	0.029	1.834	3.607
A39	0.0960	0.127574	0.016275	0.20934	0.044	0.666	-0.210
A40	0.0994	0.148358	0.02201	0.29402	0.086	2.187	6.869
A41	0.1283	0.153714	0.023628	0.33468	0.112	2.506	8.499
A42	0.2033	0.192181	0.036934	0.87422	0.764	5.931	36.267
A43	0.0681	0.118834	0.014122	0.17745	0.031	0.209	1.296
A44	0.0824	0.119662	0.014319	0.24026	0.058	1.821	4.768
A45	0.1035	0.129199	0.016692	0.21746	0.047	1.070	1.757
A46	0.1914	0.217116	0.047139	0.55344	0.306	2.461	5.669
A47	0.0797	0.116389	0.013546	0.21073	0.044	1.322	1.768
A48	0.2025	0.23738	0.056349	0.87116	0.759	4.746	24.414
A49	0.0594	0.163613	0.026769	0.25855	0.067	0.528	0.540

Company code	maen	Half Variance	Half a standard deviation	Standard deviation	Variance	Skewness	Elongation
A50	0.1402	0.212279	0.045062	0.34958	0.122	0.767	0.214
A51	0.1423	0.214477	0.046	0.57483	0.330	3.219	11.372
A52	0.0455	0.083038	0.006895	0.12167	0.015	-0.145	1.282
A53	0.0532	0.090742	0.008234	0.26283	0.069	4.335	22.883
A54	0.0558	0.097843	0.009573	0.15440	0.024	0.636	0.688
A55	0.0774	0.156744	0.024569	0.24888	0.062	0.617	0.097
A56	0.0474	0.081023	0.006565	0.13709	0.019	1.313	3.671
A57	0.0814	0.083977	0.007052	0.14650	0.021	1.807	6.748
A58	0.0908	0.159312	0.02538	0.39160	0.153	3.926	19.917
A59	0.1383	0.169445	0.028712	0.40470	0.164	3.172	12.972
A60	0.0488	0.047827	0.002287	0.15174	0.023	4.514	23.371
A61	0.0549	0.077474	0.006002	0.12599	0.016	0.499	0.918
A62	0.0736	0.127914	0.016362	0.26744	0.072	2.104	5.198
A63	0.0794	0.130589	0.017054	0.39633	0.157	4.930	27.887
A64	0.0805	0.183299	0.033598	0.38766	0.150	2.035	4.806
A65	0.0916	0.204727	0.041913	0.50080	0.251	3.337	14.267
A66	0.0764	0.121982	0.01488	0.20551	0.042	1.162	3.745
A67	0.0810	0.137214	0.018828	0.25021	0.063	1.520	3.146
A68	0.1871	0.196074	0.038445	0.48105	0.231	3.118	11.558
A69	0.0705	0.094849	0.008996	0.16866	0.028	1.346	2.207
A70	0.1052	0.102536	0.010514	0.18811	0.035	1.572	2.872

As Table 1 shows the distribution of stock returns is not normal and most businesses have a positive skewness.

Optimizing the average model - half of the variance using Genetic Algorithms

Model (1) was formed on the surface of a clear risk of a genetic algorithm was used to optimize the model. GA parameters and rates in Table 2 are shown.

Table 2: Rates and parameters of genetic algorithms to optimize portfolios

cod	Intersection		Jump		Selection	Fitness	Population	
Type of coding	Cross rate	Function Junction	Mutation rate	Function mutations	Select Type	Fitness function	Initial population	Population size
Real numbers	0.80	Sporadic	-	Adapt Feasible mutation	Uniform random	Relative	Random	30
			Stop conditions					
			Non-linear error limits			Error function	Number of generations	
			1×10^{-10000}			1×10^{-10000}	50	

Results and findings

The main objective of this research is how to choose the optimal portfolio using average - half variance optimization technique is a genetic algorithm

1. One of the basic assumptions of the model mean - variance of normal distribution of returns is assumed, while the non-normality of the distribution studies indicate that productivity and efficiency is the skewness in the distribution. But the flaw in the model mean - variance half over, and the distribution has a skewness is greater efficiency efficient frontier model, mean - variance difference half the average model - is the variance.

Using genetic algorithm to determine the weight of each constituent part of portfolio optimization is to choose one of the best portfolios. (selection, crossover and mutation) can free itself from the trap of local

optimal solution to the optimization or SEO is one of the most appropriate solutions converge.

Practical suggestions

1. The use of optimization techniques help in determining the weight of stocks in her portfolio formation. One of these genetic algorithms. Hence the investors, officials, administrators and especially students to learn the recommended financial practices of different models to optimize their portfolio to determine the optimal portfolio.

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