

FC Approach in Portfolio Selection of Tehran's Stock Market

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Abstract

The portfolio selection is one of the most important and vital decisions that a real or legal person, who invests in stock market, should make. The main purpose of this article is the determination of the optimal portfolio with regard to relations among stock returns of companies which are active in Tehran's stock market. For achieving this goal, weekly statistics of company's stocks since Farvardin 1389 until Esfand 1390, has been used. For analyzing statistics and information and examination of stocks of companies which has change in returns, factors analysis approach and clustering analysis has been used (FC approach). With using multivariate analysis and with the aim of reducing the unsystematic risk, a financial portfolio is formed. At last but not least, results of choosing the optimal portfolio rather than randomly choosing a portfolio are given.

Keywords: Optimal Portfolio, Co-movement Return, Non Systematic Risk, Clustering, Factor Analysis

JEL Classifications: G02, G11, G12, G14

1. Introduction

In the one hand, Tehran stock exchange is the center of gathering the savings and money supply of private sectors and in the other hand Tehran stock exchange is the official and safe place which Holders of dormant savings, can invest their surplus funds in companies (Sefiane & Benbouziane, 2012). Nowadays, bourse is one of the most important tools of capital market. It is taken a special role in economic growth by pricing & reducing the risk & resource mobilization & efficient allocation of capital (Duffie & Pan, 1997). The most important issue in this area is to select the optimal portfolio. According to researches, there are algorithms which are provided for determining the optimum portfolio.

One of the theories that in recent decades, had has a high position in determining the optimum portfolio, is the modern portfolio theory which belong to Harry Markowitz and William Sharpe. The modern portfolio theory has a holistic approach to the stock market. Contrary to technical or conservative approach, this theory focuses all stock in market. In other words, the perspective view of this theory is macro perspectives versus micro perspectives. One of the basic criteria for decision making in stock is stock returns. Stock returns had has informative document by itself which most investors use it to predict and analysis financial Items (Ghodrati & Zehiri, 2014). In numerous studies have been done on determining the optimal portfolio, "the risk" has been mentioned as the main criteria for determining the optimal stock portfolio. Modern portfolio theory can make basket of shares which have lower risk with expected returns (Choi Chiu & Ying Wong, 2014).

In the early 1950s Markowitz has turned portfolio to quantity by defining expected return as a mean of returning variables and risk as variance. In this model, which has been developed by him, Investors can reduce their portfolio risk for an expected return and choose the basket with the lowest risk. Given the attractiveness of the optimal portfolio in this article the optimal portfolio is formed with a view to reducing the risk. Return on investment in the stock market is always accompanied by risk. Some of these risks can be controlled by portfolio securities and diversify assets (Hung, Sohel Azad, & Fang, 2014).

Increasing the number of stocks in a portfolio, unsystematic risk is reduced and if the correlation between the types of stocks in the portfolio is low, the risk will be further reduced (Briec, Kerstens, & Woestyne, 2013). The investor who seeks the optimal portfolio should invest in companies that are not in co-movement changes in stock returns (Yao, Li, & Chenc, 2014). In this paper, we use FC approach (first Clustering, then Factor analysis method) for portfolio selection problem. The top 50 companies in stock markets are selected and information of their efficiency has been gathered. At first by using clustering, the companies classified to categorized companies with similar efficiency in a batch. To evaluate the efficiency of the companies that has co-movement changes, factor analysis method was used. Finally, the results of factor analysis and factors which induced, Changes in independent companies, returns are identified. The optimal portfolio determined in this way and non-systematic risk gets at its minimal level.

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Factor analysis used for detecting changes in the pattern of world stock markets of the past two decades. This approach has been used to form international portfolio of global stock markets. Previous studies by Ripley (1973) concluded that changes in stock market returns have a specific pattern. Hui and Kwan (1994), Naughton (1996) and Hui (2005) used the methods of factor analysis to examine patterns of systematic changes in U.S., Asia and Pacific area stock markets. Illueca and Lafuent (2002), Fernandez and coworkers (2004) used the same pattern of correlation between international stock prices for the four regions of Europe, Asia, North and South America. And the results of these studies, factors were calculated according to the international geographical divisions. Also Valadkhani, Chancharat and Harvie (2008) implement this approach to 13 countries worldwide and the factor of geographical proximity and economic development for the countries reached.

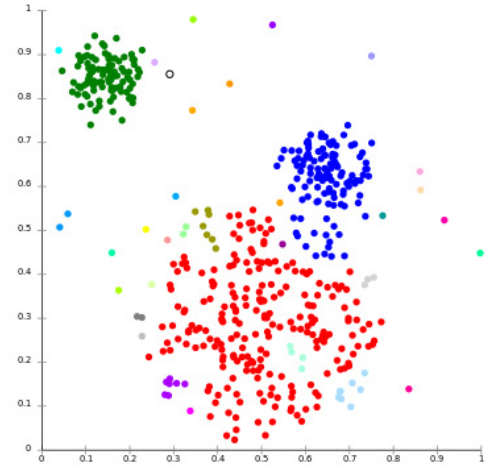
In this paper, factor analysis and clustering approach used to form an optimum portfolio in the Tehran's Stock Exchange. Clustering and factor analysis were used simultaneously and it is difference between our approach with other. In section two, multivariate methods used in this paper is introduced briefly. In the third and fourth section, the data used in this paper are introduced and the fifth section will discuss the results of the previous section. Also, to demonstrate the effectiveness of this method, comparisons will be made.

2. Statistical Method

In this section, we provide a brief description of the multivariate methods used in this research. First, a brief explanation of clustering analysis method is presented and then factor analysis is introduced.

2.1. Clustering

Clustering is way to produce homogeneous groups according to similarities. Similarity matrix can be defined based on the correlation between variables or the distance. The distance can be defined as Euclidean or statistical distance. If we have the qualitative characteristics of variables, it is necessary to quantify these characteristics and then clustering can be done. After creating the similarity matrix using one of several methods that are available for clustering, groups are determined. An example of clustering can be seen in Figure 1. Hierarchical approach is the most practical method. Hierarchical method is implemented in three ways: The shortest distance, the greatest distance and the average distance. For more information refer to (Johnson & Wichern, 2007). In this paper, the Correlation matrix of change in returns of companies is used for clustering and the maximum distance method is used.



<Figure 1> Clustering Method

2.2. Factor Analysis

Factor analysis is one of the most known and classical multivariate analysis. Factor analysis use reduced set of Independent latent variables to maximize variance of linear combinations of the original variables. Models can be defined as the following matrix form (1):

$$r - \mu = LF + \varepsilon \tag{1}$$

$r = (r_1, r_2, \dots, r_p)$ as Multivariate vector of stock returns, $\mu = (\mu_1, \mu_2, \dots, \mu_p)$ As Vector corresponding to the mean, $F = (f_1, f_2, \dots, f_p)$ As Vector of factors, $L = [l_{ij}]_{p \times n}$ As Operating matrix, l_{ij} represents the i-th variable on the j-th time. $\varepsilon = (\varepsilon_1, \varepsilon_2, \dots, \varepsilon_p)$ As the errors related As the errors related to r_i .

To estimate the orthogonal factor model, different methods are used, widely. In this paper, principal component analysis (PC) is used which operating matrix can be obtained as follows (2):

$$\hat{L} = [\hat{l}_{ij}] = \left[\sqrt{\hat{\lambda}_1} \hat{e}_1 | \sqrt{\hat{\lambda}_2} \hat{e}_2 | \dots | \sqrt{\hat{\lambda}_p} \hat{e}_p \right] \tag{2}$$

For better interpretation of the results of the factor analysis method the factors rotation is used. If P is an orthogonal matrix of $m \times m$, we can write the following relations:

$$LL' + \psi = LPP'L' + \psi = L^*(L^*)' + \psi \text{ And } r - \mu = LF + \varepsilon = L^*F^* + \varepsilon$$

which $F^* = P'F$ and $L^* = LP$ resulted.

3. Data and Statistical Population

The statistical population used in this paper is all companies listed in Tehran stock exchange. The study consisted of 50 companies on the Stock Exchange which has been chosen by following methods. Weekly returns of these companies gathered within two years, since Farvardin's 1389 until Esfand's 1390

(100 observations for 50 companies). Among various industries, industries have been selected which have clear perspective. It means in the future, the need to them increase and they are less reproducible and it cannot import and countries that are ahead of us in terms of industry cannot produce more, better or cheaper. Among the top industries, 5 industries are selected. With in each industry, companies which have the following features have been selected.

- Listed in Tehran Stock Exchange prior to 1385 fiscal year and are not out of the stock market by the end of 1390 fiscal year.
- Entrepreneurial of listed companies in Tehran Stock Exchange and have an acceptable performance.
- Companies which have not a negative book value.
- With in this research, the exchange of their stock, stop not more than three months.
- The irfiscal year end in Esfand.
- All information such as stock prices, the amount of dividend, market value and capital value are available.
- In the desired period have continuous activity in stock and its index available

4. Calculation of Return Index

One of the basic criteria for decision making in stock market is stock return. Stock returns have greate information content itself and used in financial analysis and forecasting by potential investors. To calculate the return of the company three items are used: financial difference in the share price between beginning of the period and end of the period, dividend per share and increase the company's capital reserves in a given period.

To calculate the rate of return of a share at the moment from the beginning of the period, the following equation is used (3):

$$\frac{((Base\ price - Price\ of\ day) + DPS + Priority + Bonus\ shares) \times 100}{Base\ price + (1000 \times the\ Percent\ of\ the\ Capital\ increasment)} \quad (3)$$

It is assumed that the investor involves in increase assets of company. The following is a brief description of the parameters used in the equation.

- Priority: The benefits earned percent increase incapital entitled to the shareholder.
- Bonus shares: Benefits from the reserves as a percentage of the capital increase will be paid to shareholders.
- Dividend per share: The amounts of the dividend will be paid to shareholders upon approval of the ordinary general assembly.
- Price of day: The closing price on the day.
- Base price: The closing price on the last day before the start of the range which reported.

Finally, it is important to note that the information needed to calculate the return of companies have been extracted from RAHAVARD NOVIN software.

5. Forming Optimum Portfolio

After a brief description of the data & statistical methods used in the paper, in this section the implementation of statistical methods on he collected data is presented, and then the result that is the formation of an optimum portfolio will be presented. Data needed in the paper were collected using RAHAVARD NOVIN software & calculation of the statistical methods used in the paper is performed with SAS software. As

<Table 1>The Selected Industries and Companies

Banks and financial institutions	Basic metals (rolling and casting)	Basic metals (metal products)	Chemical	Drug	Cement, lime, gypsum
1. Eghtesade Novin Bank	1. Sadid Group	1. Khoozestan Steel	1. Farabi Petrochemical	1. Zahravi Drug	1. Kerman Cement
2. Mellat Bank	2. Isfahan Mobarakeh Steel	2. Calcimine	2. Fanavaran Petrochemical	2. Razak Drug	2. East Cement
3. Parsian Bank	3. Pipe & Mechin Manufacturing	2. Khorasan Steel	3. Shazand Petrochemical	3. Jaber Hayan Drug	3. West Cement
4. Karafarin Bank	4. Amir Kabir Steel	3. National Lead and Zinc	4. Iran Chemical Industries	4. Sobhan Drug	4. Oromiye Cement
		4. National Industries of Iranian Copper	5. Niro Kolor	5. Farabi Drug	5. Sufian Cement
Computer	Investments	Metal ores	Petroleum coke nuclear	Automotive and Parts (Automotives)	Automotive and Parts (Parts)
1. Anformatic Services	1. Damavand Sar Atiye	1. Golgohar	1. North Drilling	1. Tractor Motorsazan	1. Tractor Foundry
2. Iran Data Processing	2. Behshahr Sar Gorouh	2. Manganese Mines of Iran	2. Pars Oil	2. Saipa Diesel	2. East Electric Khodro
	3. Sar. SAIPA	3. Zinc Mines of Iran	3. Esfahan Oil.Refining	3. Pars Khodro	3. Zamyad
				4. SAIPA	4. Mashhad Ring
				5. Iran Khodro	5. Charkheshgar
					6. Car Parts

mentioned, the data used in this paper are the weekly returns of 50 companies in Tehran's Stock exchange from Farvardin 1388 to Esfand 1390. For statistical analysis of collected data, an $n \times p$ matrix is formed. P is the number of variables or society attributes, that here is considered equal to the number of companies ($P=50$) and N is the number of observations & equals to the number of weekly returns over the biennium. ($N=100$)

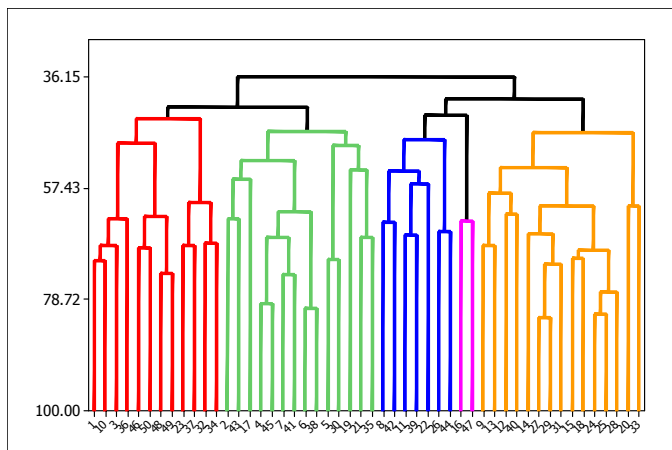
After producing clusters, to create an independent group & determination of companies with counter returns changes, according to the observation matrix in each cluster, correlation matrix is created between companies, but due to the high dispersion of the correlation data between companies and in order to obtain a clearer image of the companies' stock grouping

<Table 2> Results of Clustering

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
1. North Drilling	13. Pipe & Mechin Manufacturing	27. Behshahr Sar Gorouh	34. Sar. SAIPA	49. Farabi Petrochemical
2. Esfahan Oil.Refining	14. Amir Kabir Steel	28. Eghtesade Novin Bank	35. Iran Chemical Industries	50. Niro Kolor
3. Pars Oil	15. Manganese Mines of Iran	29. Karafarin Bank	36. Mellat Bank	
4. Iran Data Processing	16. Zinc Mines of Iran	30. Tractor Foundry	37. Iran Khodro	
5. Zahravi Drug	17. Khorasan Steel	31. Damavand Sar Atiye	38. Khoozestan Steel	
6. Razak Drug	18. Petrochemical Fanavaran	32. Parsian Bank	39. shazand Petrochemical	
7. Jaber Hayan Drug	10. Sufian Cement	33. Sadid Group	40. Saipa Diesel	
8. Anformatic Services	20. Tractor Motorsazan		41. Pars Khodro	
9. Kerman Cement	21. Charkheshgar		42. Sobhan Drug	
10. East Cement	22. SAIPA		43. East Electric Khodro	
11. West Cement	23. Calcimine		44. Zamyad	
12. Oromiye Cement	24. National Industries of Iranian Copper		45. Mashhad Ring	
	25. Golgohar		46. Car Parts	
	26. Isfahan Mobarakeh Steel		47. National Lead and Zinc	
			48. Farabi Drug	

At first, to produce more homogenous groups, the clustering method is used on the matrix. The result is producing 5 homogenous groups of companies with the same returns during the biennium. For clustering, similarity matrix based on correlation & the Complete Linkage method has been used for clustering. Table 2 and Figure 2 show 5 Cluster gerated and similarity levels:

based on alignment f return's changes, factor analysis of the correlation matrix is used. The results of factor analysis on the companies settled in a cluster can be seen in Table 3. The results are presented using the varimax method to facilitate the interpretation of results. As can be seen the obtained outputs of the method, are 4 factors. In each factor the companies which have the highest score of the factor form the factor.



<Figure 2> Dendrogram of Clustering

So according to Table 3, it can be argued that the first factor is about to cement industry, the second is about oil industry, the third is about pharmaceutical industry and the fourth is about computer industry. in fact, the forming companies of these factors have counter return changes and are independent from each other's. So, investors who want to reduce their un-systematic portfolio's risk through diversification of stock basket must not use the companies that forming a factor together, at the same time.

<Table 3> Determining the Factors of Cluster 1

Communality	Factor 4	Factor 3	Factor 2	Factor 1	Company
0.5713	0.18078	0.02330	0.72834	0.06567	North Drilling
0.5445	0.34451	0.06335	0.64208	0.09810	Esfahan Oil.Refining
0.7085	-0.16682	0.12364	0.81550	0.02091	Pars Oil
0.4473	0.52881	0.31102	0.26534	-0.0224	Iran Data Processing
0.6478	0.16845	0.78436	-0.06523	-0.00562	Zahravi Drug
0.5223	0.33927	0.56002	0.28325	0.11566	Razak Drug
0.5443	-0.05242	0.56673	0.46614	0.05591	Jaber Hayan Drug
0.8501	0.91776	0.07970	-0.00738	0.03860	Anformatic Services
0.5558	0.12956	-0.30353	0.14643	0.65230	Kerman Cement
0.5491	0.02191	0.12540	-0.03512	0.72915	East Cement
0.6344	0.00032	0.30070	0.02376	0.73723	West Cement
0.5129	-0.04239	-0.05858	0.08892	0.70696	Oromiye Cement
	<i>1.0103</i>	<i>1.3092</i>	<i>1.8547</i>	<i>2.9147</i>	<i>Eigenvalues</i>
	<i>0.5908</i>	<i>0.5066</i>	<i>0.3975</i>	<i>0.2429</i>	<i>Proportion of total variance</i>

<Table 4> Determining the Factors of Cluster 2

Communality	Factor 5	Factor 4	Factor 3	Factor 2	Factor 1	Company
0.5645	0.24361	0.22114	0.64435	-0.17215	0.10711	Pipe & Mechin Manufacturing
0.6142	-0.07074	0.20475	-0.07135	0.13243	0.73806	Amir Kabir Steel
0.7024	-0.41520	0.05278	0.59919	0.41017	0.00381	Manganese Mines of Iran
0.6664	0.19836	0.47339	0.09629	0.01958	0.62719	Zinc Mines of Iran
0.6473	0.01565	-0.31198	0.31176	0.24578	0.62626	Khorasan Steel
0.7273	0.81397	-0.13121	0.18866	0.07677	0.07816	Petrochemical Fanavaran
0.6777	-0.15782	0.78457	0.16604	0.09822	-0.0803	Sufian Cement
0.5203	0.03738	0.07675	-0.17592	0.64973	0.24493	Tractor Motorsazan
0.5908	-0.1708	-0.13551	0.25636	0.69045	-0.02867	Charkheshgar
0.7079	0.39156	0.22859	-0.12655	0.69400	0.06902	SAIPA
0.5827	0.20440	0.28434	0.07380	-0.11503	0.66442	Calcimine
0.6456	0.04489	-0.10391	0.05011	0.01747	0.79374	National Industries of Iranian Copper
0.5324	0.07901	0.01890	0.71978	-0.00694	0.08772	Golgozar
0.7138	-0.02315	-0.15305	0.07560	0.15546	0.81240	Isfahan Mobarakeh Steel
	<i>1.1055</i>	<i>1.1712</i>	<i>1.4548</i>	<i>1.6265</i>	<i>3.5359</i>	<i>Eigenvalues</i>
	<i>0.6353</i>	<i>0.5563</i>	<i>0.4727</i>	<i>0.3687</i>	<i>0.2526</i>	<i>Proportion of total variance</i>

<Table 5> Determining the Factors of Cluster 3

Communality	Factor 2	Factor 1	Company
0.4756	0.12345	0.67853	Behshahr Sar Gorouh
0.5596	-0.15979	0.73081	Eghtesade Novin Bank
0.2972	-0.00645	0.54517	Karafarin Bank
0.6379	0.78435	0.15077	Tractor Foundry
0.3937	0.11547	0.61679	Damavand Sar Atiye
0.2578	0.29703	0.41183	Parsian Bank
0.6306	0.78945	-0.08630	Sadid Group
	<i>1.3051</i>	<i>1.9476</i>	<i>Eigenvalues</i>
	<i>0.4647</i>	<i>0.2782</i>	<i>Proportion of total variance</i>

<Table 6> Determining the Factors of Cluster 4

Communality	Factor 4	Factor 3	Factor 2	Factor 1	Company
0.6665	0.74695	0.16849	0.28305	0.00942	Sar. SAIPA
0.5744	0.08812	0.01868	0.74535	0.11626	Iran Chemical Industries
0.5210	0.65800	0.01437	0.06775	0.28860	Mellat Bank
0.4530	-0.04705	0.01758	0.35593	0.56908	Iran Khodro
0.4623	0.13451	0.52240	0.25292	0.32772	Khoozestan Steel
0.4847	-0.00463	0.33378	0.57390	0.38565	Shazand Petrochemical
0.5881	0.14056	0.74702	-0.09563	-0.03501	Saipa Diesel
0.7348	0.36611	0.17236	0.41433	0.55370	Pars Khodro
0.6223	0.26084	0.31848	0.53870	0.40333	Sobhan Drug
0.7289	0.27307	0.22161	0.07195	0.77465	East Electric Khodro
0.7119	0.32487	0.67025	0.18363	0.35129	Zamyad
0.6425	0.31301	0.12471	0.12074	0.71725	Mashhad Ring
0.6990	0.03411	0.05653	-0.00062	0.83349	Car Parts
0.5758	-0.41339	0.63317	0.03269	0.05448	National Lead and Zinc
0.4786	0.13414	-0.04104	0.67739	-0.00958	Farabi Drug
	<i>1.0427</i>	<i>1.2394</i>	<i>1.4697</i>	<i>5.1926</i>	<i>Eigenvalues</i>
	<i>0.5963</i>	<i>0.5268</i>	<i>0.4441</i>	<i>0.3461</i>	<i>Proportion of total variance</i>

<Table 7> Determining the Factors of Cluster 5

Communality	Factor 1	Company
0.6368	0.79803	Farabi Petrochemical
0.6368	0.79803	Niro Kolor
	1.2737	Eigenvalues
	0.6368	Proportion of total variance

Rise of income by diversifying financial portfolios by buying the stocks from these companies at the same time, is not possible. Because stock returns of these companies are highly correlated. It's recommended to select from each factor that only one company which has the highest factor score. Similarly, factor analysis method is implemented on other groups. The results in Table 4, 5, 6 & 7 can be seen. 5 factors in the second group, 2 factors in the third, and 4 factors in the fourth & only one factor in the fifth group are obtained. Each factor represents a particular industry or industries that are somehow connected and therefore the returns of domestic companies of a factor are dependent to each other.

According to the research conducted by Gordon and Tang (2004) in Hong Kong, portfolio contains 10 to 15 different stocks; probably the most benefits obtain from simple diversification. Portfolio with stocks led to useless diversification and should be avoided. His study showed that if 15 different stocks be chosen for the basket, without any decrease in returns, 95% of unsystematic risks disappear. So to form an optimum portfolio according to the foregoing principle & factors obtained from each cluster which totally forms 16 factors, it is enough to settle a company from each factor in the final portfolio, and then the portfolio forms. To optimize the portfolio, the company with the highest factor score is selected. Optimum

portfolio can be seen in table 8.

<Table 8> Presentation of Each Factor and Portfolio Selection

Cluster	Factor	Industry	Top Companies (Optimal Portfolio)
1	factor 1	Cement, lime, gypsum	West Cement
	factor 2	Petroleum coke nuclear	Pars Oil
	factor 3	Drug	Zahravi Drug
	factor 4	Computer	Anformatic Services
2	factor 1	Basic metals and metal ores	Isfahan Mobarakeh Steel
	factor 2	Automotive and Parts	SAIPA
	factor 3	Nonferrous and ferrous metal mines	Golgohar
	factor 4	Cement, lime, gypsum	Sufian Cement
	factor 5	Chemica	Petrochemical Fanavaran
3	factor 1	Investment, banks and financial institutions	Eghtesade Novin Bank
	factor 2	Automotive and Parts	Sadid Group
4	factor 1	Automotive and Parts	Car Parts
	factor 2	Drug and Chemical	Iran Chemical Industries
	factor 3	Automotive and Steel	Saipa Diesel
	factor 4	Investment banks and financial institutions	Sar. SAIPA
5	factor 1	Chemical	Niro Kolor

6. Validation of the Proposed Approach

In this section the results obtained from implementing the proposed method in this paper are compared to select the optimum portfolio using a randomly selected portfolio. Evaluation criteria are the portfolio's return & stock basket's risk. The expected return of a portfolio is the weighted average returns of stocks forming the portfolio and is calculated by equation (4).

$$r = \sum_{i=1}^N w_i r_i \tag{4}$$

The portfolio risk as weighted standard deviation of returns of the portfolio's forming stocks and is calculated by equation (5).

$$\sigma = \left[\sum_{i=1}^N \sum_{j=1}^N w_i w_j \sigma_{ij} \right]^{1/2} \tag{5}$$

Here it is assumed that the weight of all the stocks in the portfolio, are equal & from each stock only one is settled in the portfolio. To form a portfolio randomly, examine two different conditions & in any cases we repeat the experiment several times. Random selection of the portfolio includes cases:

- Selecting several industries out of the 10 introduced industries randomly & considering all the selected companies to form portfolio (some how the number of forming companies in selected industries, reaches 16).
- Selecting 16 companies out of the 50 companies randomly.

Portfolio selection obtained results by calculating return & risk criteria are presented in Table 9.

<Table 9> Results of Comparing Proposed Approach & Random Selection Approach

Risk	Returns	Portfolio Selection Method
83.8206	23.4427	Proposed method (FC Method)
98.3495	22.9384	
98.9805	12.8856	
84.4039	18.1015	
98.9583	17.3598	
101.3265	11.1026	
99.3621	15.6983	
95.2589	17.3961	
90.3268	16.3592	
97.3925	20.3654	
106.3356	18.3962	Random Selection (case 1)
84.0278	12.5964	
82.124	14.1812	
104.3337	17.4664	
85.3691	16.5698	
110.6324	14.3628	
90.3594	20.6324	
99.2564	12.3592	
83.9265	11.3459	
95.2365	22.0325	
100.2657	18.6532	Random Selection (case 2)

As can be seen in Table 9 return & risk of the formed portfolio of the proposed method in the study have better values than random selection of the portfolio. This is a proof of desirability of the proposed method.

7. Conclusions

In this study, the data of weekly returns (from Farvardin 1388 to Esfand 1390) considered to analyze the correlation between returns of 50 companies in Tehran Stock Exchange. Then by using the obtained data, determine the optimum portfolio of Tehran Stock Exchange's companies performed using multivariate analysis method & considering unsystematic risk. FC approach was used to form the optimal portfolio. At first, the clustering was performed to settle the companies with similar re-

turns in a group. To have the least unsystematic risks, the companies with similar changes should not appear in portfolio at the same time. Due to this fact & the results of this analysis, the optimum portfolio formed.

Finally, comparisons were made between the random portfolio selection & desirability of the proposed method was confirmed. As a final discussion, since a significant part of investors in Tehran Stock Exchange own a few number of stocks, it's recommended to all managers & investors that always use the basic principle of diversification to avoid unrewarded risk. And remember that rewards or adventuring is only devoted to systematic (irreducible) risk & to minimize the unsystematic risk through diversification, do not invest on the companies with in co-movement return changes, at the same time.

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