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Main Affecting Criterion on Stock Selection in Tehran Stock Exchange

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Abstract

This study aims to identify and evaluate the main criteria for stock selection through DEMATEL method. The most important part of DEMATEL is calculation of D, R, D + R and D-R. D is equal to addition of elements in each row that for each factor indicates its influence on other system factors. In other words, as the value of D is greater, its influence on the other factors would be higher. According to the results for the evaluation of the main criteria of the fourth chapter, criteria of market, risk, growth and profitability are having more impact on other factors, respectively. In other words, more fluctuating market leads to more fluctuating criteria of risk, profitability, and stocks growth. Moreover, the more certainty or uncertainty exist in risk criteria, there will be greater impact on growth and profitability of the stock.

Keywords: *stock selection criterion, investment, exchange, risk.*

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1. Introduction

Economic development requires capital accumulation. Most economic trends and theories have emphasized on this point that the concentration of capital is the first economic condition. In this regard capital market has an effective role in mobilizing financial resources and capitals for the economic growth and development of countries; and even now, in many countries of the world, it is responsible for financing economic institutions (Heidarzadeh, 2011).
Capital market is a place in which it may create capital formation, and with optimal performance, it can provide facilities necessary to transfer people's savings and funds to provide investment opportunities. In this regard, securities, which is the main pillar of the financial system in each country, complies with organized methods for trading securities and increases the number of alternatives available for those interested in investment. (Letafati, 2009). This feature provides a monetary inventory to finance production units. On the other hand, the economic balance and fair distribution of income among all segments of society and the lack of extra income through non-productive or false investments, leads the public to invest in manufacturing and commercial companies.

Uncertainties of market nature leads to lack of predicting the exact future of shares and as results increases the risk. This condition exists in all stocks and it is inevitable. And controlled condition is an appropriate way for selection and management of appropriate set of securities (portfolio), respectively. Portfolio is a critical decision-making for investors (Letafati, 2009). So choosing a portfolio with a high rate of return and controlled risk is one of the issues that many researchers are concerned with (Mirzadeh, 2008). Therefore the author in this study, aims to identify and assess the impact of main criteria in stock selection in Tehran Stock Exchange.

2. Literature Review

Ahmadpour et al. (2009) used Multi Attribute Decision Making models to examine the variables affecting the selection of suitable stock in listed pharmaceutical companies. These factors include the ratio of price to earnings, earnings per share, dividend per share, the ratio of market value to book value, price to sales ratio, debt-equity ratio, return on equity, return on assets, return equity, the value of market investment, dividend trends, trading volume and the company's information disclosure and transparency. Among these indices, trading volume and market investment value have the highest amount of weight and importance.

Sokhkian et al. (2010) used multi- attribute decision-making models to examine the variables affecting the selection of stocks in Tehran Stock Exchange. In this research, Traian Electre one of the components of the multi-criteria decision making model (MCDM) is introduced as a method for stock selection by using financial ratios, to identify companies in a different industry or industries that are in a period of their best time. In this study, important points in profitability ratios are used as the data and 54 companies were compared in an industry and finally the priorities of shareholders was determined.

In a study by Amiri et al. (2010), TOPSIS and ANP methods were used to select the optimal portfolio of shares in 40 companies in the Stock Exchange during the period of (2006 – 2009). In this study, four criteria including profitability cluster (includes criteria of ROA, ROE, net profit margin, operating profit margin, earnings per share) growth cluster (including the rate of revenue growth, net profit growth rate, growth rate earnings per share, the sustainable growth rate), risk cluster (including commercial risk, financial risk, systemic risk) and market cluster (including the ratio of market value to book value, price to earnings ratio, dividend payout ratio) were used. The criteria weights are calculated using analytic network process. Companies were ranked by using TOPSIS. The experimental findings of this study suggest that companies with lower rankings have experienced better performance.

Pahlavan et al (2012) used fuzzy network analysis to prioritize the factors affecting the process of stock selection in Tehran Stock Exchange. The results of this study show that variables of earnings per share, net profit margin, return on assets, earnings per share growth, net profit growth rate, income growth rate, the ratio of price to earnings and ratio of market value to book value, business risk, financial risk and the systematic risk are considered as the most important factors in the customers' decision to select the stock.

Pourghafar et al. (2015) examined the affecting variables on the stock selection and ranking, as well as the correlations between these variables and stock returns in 84 companies in Tehran

Stock Exchange in years (2006 to 2010). For this purpose, by using factor analysis and hierarchical analysis, identification of variables affecting the stock selection and their ranking will be discussed. The results of this study show that among 25 affecting variables for stock selection, according to factor analysis technique, finally, eight affecting variables for the stock selection in Tehran Stock Exchange were determined. in order of priority or ranking they include: average dividends, dividend trend, dividend per share, profit per share, net income to sales ratio, the ratio of operating profit to sales, return on equity and return on assets. The results of Spearman's ranking correlation coefficient also implies significant and positive correlations between variables and stock returns in these companies.

Samaras et al. (2008) used multi-criteria method for evaluating a company's stock at Athens Stock Exchange. This method is based on fundamental analysis ratios and uses UTA Star method for classification of stocks from best to worst in terms of risk-taking power of investor. The system is designed for corporate and private investors and uses large volume of information and operates them in the real world, so that the data are always up to date.

Tiryaki, F. & B. Ahlatcioglu (2009) examined the variables affecting the stock selection in Turkey. Based on this research factors of economic, political, technological, profitability, firm size and technological controls, respectively, had the highest importance in stock selection.

Kheradyar & Ebrahim (2011) used panel data approach to assess the impact of stock price and dividend per share on stock returns in 77 Malaysian companies during 2000 – 2009. The results showed that stock price and dividend per share have a positive impact on stock returns in this country.

Beshkoh & Afshari (2012) used AHP to evaluate the factors affecting the stock market. The results of this study showed that variables of stock price, dividend, earnings per share, management, operating income, technology, P/E, the size of the company, EVA and the systematic risk have more weights and impact compared with other variables.

Janani et al. (2014) used TOPSIS technique to study the factors affecting the portfolio selection in Tehran Stock Exchange over a period of five years. The findings of this study indicated that the variables of dividends, systematic risk, trading volume and price to earnings ratio are of the variables affecting the portfolio selection.
Odin et al. (2015) used regression analysis to examine factors affecting stock prices in the stock market in Bangladesh Dhaka during 2005 - 2011. The empirical results indicates that the variables of dividend per share, net asset value, the net profit after tax and price to earnings ratio are the most important variables.

3. Methodology

The present study is an applied research. DEMATEL technique is used in this study.

3.1. DEMATEL method

DEMATEL technique is commonly used to investigate the very complex issues of the world. DEMATEL is also used to structure a sequence of constructive knowledge. Thus, the intensity of communication is examined in the way of scoring and feedbacks with their importance are investigated and inalienable relations are accepted. DEMATEL technique have advantages as follows:

1 - Interconnections; the advantage of this method over a network analysis technique is its clarity in reflecting the interaction between large components. As, experts are able to express their views on the impacts predominately (direction and severity of impacts) among factors. It should be noted that the obtained matrix from the DEMATEL technique (internal communications matrix), in fact, is a constituent part of the super matrix. In other words, DEMATEL technique does not act independently but is considered as a subsystem of a larger system such as the ANP.

2 - Structuring complex factors in form of cause and effect. This is clearly one of the most important functions and is one of the most important reasons for its frequent application in problem-solving processes. In this case, by classification of a wide range of complex factors in the form of cause-effect, the decision maker will be in better condition to understand the relationships. These results lead to better understanding of status and roles in mutual influences.

Four stages have been identified for DEMATEL technique:

1) Direct correlation matrix (M)

When we use the point of view of some people, we use the simple average of opinions and we constitute the opinions matrix mean.

2) Normalizing the direct relation matrix N=K*M:

Which in this formula K is calculated as follows; first the sum of all rows and columns is calculated. Reverse of the largest number forms row and column of k.

$$k = \frac{1}{\max \sum_{j=1}^{n} a_{ij}}$$

3) Calculation of full relation matrix

$$T = N \times (1 - N)^{-1}$$

4) Formation of causal diagram

Total elements of each row (D) for each factor indicates the effectiveness of that factor on other factors of system (how much variables have impact).

Total elements of the column (R) for each factor reflects the influence of that factor from other factors of the system (how much variables are affected).

Therefore, the horizontal vector (D+R) is the impact of the interaction of system. In other words, as much as the amount of D+R of a factor is high, that factor has more interaction with other factors of the system.

Vertical vector (D-R) indicates the strength of influence of each factor. Generally, if (D-R) is positive, a variable is a causal variable. If it is negative, it is considered to be an effect.

Finally, a Cartesian coordinate system is drawn. In this system, the longitudinal axis and the transverse axis are based on the values of D + R and D – R, respectively. The position of each factor is given by a point (D + R, D - R) in the system. Thus, a graphic diagram can be obtained.

In this study, according Table 1, criteria will be compared. And the effect and influence of each one will be evaluated:

Table 1: Cause and effect relationships in DEMATEL

Very high impact	**High impact**	**Low impact**	**Very low impact**	**No impact**
۴	۳	۲	۱	۰

3.2
Reliability and Validity

In this study, due to the use of multi-criteria decision making techniques (DEMATEL), consistency rate is used to assess the reliability of respondents' answers. Consistency rate is a tool which identifies consistency and shows the extent to which the priorities of comparisons can be trusted. If consistency is less than 0/10, consistency comparisons is acceptable. Otherwise, the comparison should be reconsidered.

Consistency index obtained from paired comparisons is $C = \frac{3.01-3}{2} = 0.005$ and it will be used to calculate the consistency ratio (less than 0/1):

$$CR = \frac{0.005}{0.58} = 0.01$$

As can be seen, the consistency ratio is 0/01, which is less than 0/1. Thus, the reliability of responses (paired comparisons) is acceptable.

3.3 Sample

The sample consists of all financial and investment managers in companies listed on the Stock Exchange, given having the condition of expertise. In this study, in addition to field studies and experts discussions, 30 experts of capital market were selected. Experts' charachtristics were as follows:

• Related technical knowledge at least at MS level.
• More than 10 years of working experience in relevant posts.

• Having all stock certificates.

4. Findings

4.1. Descriptive Statistics

The sample contains 30 individuals from brokerage, funds and financing companies and stock exchange forum; and its frequency is as follows.

22 of 30 of respondents are males and 8 of them are females. The majority of respondents (36/78) percent are in the age group of 41 years old and above, respectively. Only 6 percent of respondents are under 25 years old.

The majority of respondents (44/8) percent have 11 to 15 years of working experience. The 29/9% of respondents less than 10 years and 25/4% more than 15 years of working experience.

4.2 DEMATEL Technique to Study Criteria Interactions

At this stage, 30 questionnaires have been completed by 30 experts of stock exchange located in Tehran. In order to evaluate the impact of all criteria, first we examine the relationship between criteria of profitability, growth, market and risk.

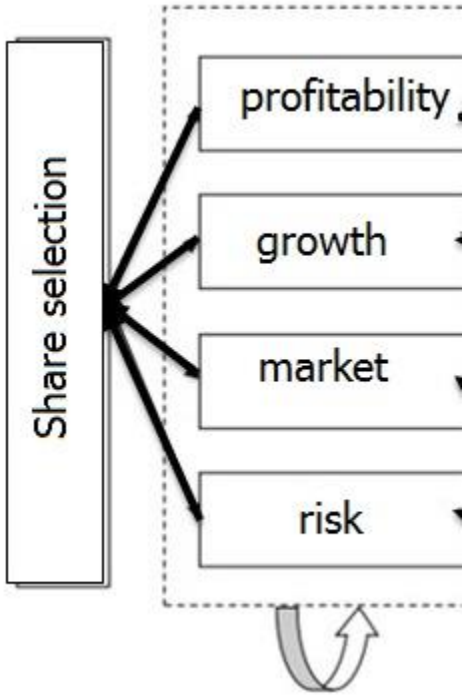

Figure 1: main criteria

The calculations were done according to the following steps:

The mean of opinions from all the experts was estimated. Thus, matrix M is formed (Table 2).

Table 2: Direct correlation matrix (questionnaires mean)

M	profitability	growth	market	risk

profitability	0.000	2.867	3.033	3.200
growth	0.353	0.000	2.933	3.167
market	0.394	0.314	0.000	3.300
risk	0.367	0.383	0.342	0.000

1. In this step, we should consider normalization of matrix M. According to the formula N=K×M, the value of K must be achieved.

$$k = \frac{1}{\max \sum_{j=1}^{n} a_{ij}}$$

For calculating K, the sum of all rows and columns will be calculated. The maximum value will be selected, and will be reversed. According to the results, the maximum amount is equal to 9.667, and K = $\frac{1}{9.667} = 0.103$.

Table 2: normalization of matrix M

K	profitability	growth	market	risk	sum of all rows
profitability	0.000	2.867	3.033	3.200	9.100
growth	0.353	0.000	2.933	3.167	6.453
market	0.394	0.314	0.000	3.300	4.008
risk	0.367	0.383	0.342	0.000	1.091
sum of all columns	1.114	3.564	6.308	9.667	

The normalized matrix is as shown in table 2.

Table 3: normalization of matrix M (N=K×M)

N	profitability	growth	market	risk
profitability	0.000	0.295	0.312	0.330
growth	0.036	0.000	0.302	0.326
market	0.041	0.032	0.000	0.340
risk	0.038	0.039	0.035	0.000

2. Full communication matrix

In Accordance with $T = N \times (1 - N)^{-1}$, normal matrix will be subtract by one, and then will be reversed and multiplied by normalized matrix. The results are shown in Tables 4 to 6.

Table 4: Matrix (1-N)

1-N	profitability	growth	market	risk
profitability	1.000	0.705	0.688	0.670
growth	0.964	1.000	0.698	0.674
market	0.959	0.968	1.000	0.660
risk	0.962	0.961	0.965	1.000

Table 5: reversed Matrix (1-N)

1-N	profitability	growth	market	risk
profitability	3.357	-0.254	-0.343	-1.853
growth	-2.963	3.461	-0.123	-0.265
market	-0.275	-2.954	3.173	0.080
risk	-0.119	-0.231	-2.613	2.960

Table 6: Full communication matrix T

T		growth	market	risk
profitability	0.000	-0.075	-0.107	-0.611
growth	-0.108	0.000	-0.037	-0.086
market	-0.011	-0.095	0.000	0.027
risk	-0.004	-0.009	-0.092	0.000

3. Calculate total elements of each row (D) for each factor indicates the effectiveness of that factor on other factors of system (variables' impact). The results are shown in table 7.

4. Calculate total elements of the column (R) for each factor reflects the influence of that factor from other factors of the system (how much variables are affected). The results are shown in table 7.

5. Calculate (D + R) which is the impact of the desired factor in the system. In other words, as much as the amount of D+R of a factor is high, that factor has more interaction with other factors of the system (Table 7).

6. Calculate (D - R) that shows indicates the strength of influence of each factor. Generally, if (D-R) is positive, a variable is a causal variable. If it is negative, it is considered to be an effect.

Table 7: The amount of influence and being affected of criteria

criteria	D	R	D+R	D-R
profitability	-0.793	-0.12327	-0.916	-0.670
growth	-0.231	-0.17948	-0.411	-0.052
market	-0.079	-0.23625	-0.316	0.157
risk	-0.106	-0.66996	-0.776	0.564

5. Conclusions

In this study, to investigate the interaction between criteria, DEMATEL method is used. The most important part of DEMATEL is calculation of D, R, D+R and D-R. D is equal to addition of elements in each row that for each factor indicates its influence on other system factors. In other words, as the value of D is greater, its influence on the other factors would be higher. According to the results for the evaluation of the main criteria of the fourth chapter, criteria of market, risk, growth and profitability are having more impact on other factors, respectively. In other words, more fluctuating market leads to more fluctuating criteria of risk, profitability, and stocks growth. Moreover, the more certainty or uncertainty exist in risk criteria, there will be greater impact on growth and profitability of the stock.

R discusses the issue from a different perspective and is equal to total elements of the column for each factor reflects the influence of that factor from other factors of the system. According to the calculations, profitability, growth, risk and market have higher impact than other factors.

D + R is the impact of the interaction of system. In other words, as much as the amount of D+R of a factor is high, that factor has more interaction with other factors of the system. According to the results of section IV, market, growth, risk and profitability have most interaction than other factors.

D-R indicates the strength of influence of each factor. Generally, if
(D-R) is positive, a variable is a causal variable. If it is negative, it is considered to be an effect. Therefore, in general, the market criteria and risk have been considered as influential variables and criteria of profitability and growth are affected variables, respectively.

Hadavinejad (2004) used multi-criteria decision-making models to identify factors affecting stock selection in Tehran Stock Exchange (limited to the cement companies). The results of this study showed that the profitability, technological and economic control are the most important factor affecting the profitability. This study is in line with our results in terms of profitability variable.

In a study by Amiri et al. (2010), TOPSIS and ANP methods were used to select the optimal portfolio of shares in 40 companies in the Stock Exchange during the period of (2006 – 2009). In this study, four criteria including profitability, growth, risk cluster and market cluster were used. The criteria weights are calculated using analytic network process. Companies were ranked by using TOPSIS. The experimental findings of this study suggest that companies with lower rankings have experienced better performance.

The results of this study with the results of our study are in line in terms of profitability and growth and risk, market and their impact was considered them in parallel for stock selection.

5.1. Research Limitations

In order to promote our research and to reach the objectives, we had faced some limitations:

- Some experts have not been willing to respond to the questionnaire due to job security.
- Due to the sensitive and accurate results, appropriate time and concentration on answering the questionnaire was necessary, which was difficult since the experts were busy most of the time.

5.2. Suggestion

According to the results of this study, we present some suggestions:

- Given that market, risk, growth and profitability has been more influential on other factors, respectively. It is recommended that more concern and control be taken into account in clusters of market and growth for stock selection.
- According to the results, market and risk are considered as causal variables (impact) and criteria of profitability and growth are considered as affected variables. As a result, for the improvement of profitability and growth, more concern and control should be taken into account on market and risk criteria.

5.3. Recommendations for Future Studies

By reviewing studies that had been done in the past and the system of buying and selling shares, which are trying to win the market competition and gain profit. And also, according to the results of this study, the following recommendations for future studies can be mentioned:

- more economic measures taken in the field of portfolio management.
- one can also consider quantitative criteria, to assess the qualitative criteria.

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