

## Rating of firms involved in Tehran Stock Exchange based on the accounting and non-accounting criteria using Fuzzy Topsis method

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**Abstract:** In this study, companies operating in the Tehran Stock Exchange based on accounting standards (which are directly derived from the Company's financial statement data) include: Cash conversion cycle, liquidity, capital structure, return on assets and the size of the company and also non-accounting criteria for performance evaluation include: Economic value added, Jensen's alpha, Sharpe Ratio and proportion Trainor, using Fuzzy Topsis method ranked and with ranking based on the Tehran Stock Exchange indices were compared and their correlation were obtained. The main objective of this study is to determine whether the company according to reports from Tehran Stock Exchange is ranked top among other companies, in ranking based on accounting and non-accounting criteria for evaluating the performance of other companies is higher or not. The research method used for this study was survey. To do the calculations and analyze the spreadsheet data software (Excel) and to test hypotheses 16 Spss and Spearman correlation coefficient was used. The results of hypothesis testing and correlation analysis shows that between ranking companies of Stock Exchange based on stock indexes and ranking based on accounting and non-accounting variables, there is a weak correlation and the ranking of the exchange only in terms of liquidity and return on assets, of accounting standards, and of non accounting standards with Jensen's alpha coefficient and Economic value added, there is a significant relationship.

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**Keywords:** Fuzzy TOPSIS technique, rating of superior companies, accounting and non-accounting criteria, the cash conversion cycle, size, Sharpe ratio.

### Introduction

The role of trade and commerce units in economic structure is no secret. Today, the business units as the main foundation of the economy use a lot of economic resources, such as labor force, raw materials, capital and...etc., and taking into account the volume of production and sales you can understand this theme that an important role it plays in economic development. It is impossible a company with other companies are not related. Evaluate the performance of the business units in market and ranking them in order is importance that investors and stock traders be able to keep, sell or buy shares of various companies to adopt the necessary decisions in due time. It is natural that investors are looking stocks that perform better than other companies and the market. Since the users without the benefit of information, can not determine appropriate opportunities and risks of the investment, providing a ranked list of companies in the Tehran Stock Exchange assists to the diversity and quality of information on direction of the efficiency of the market. But it is noticeable gaps, lack of authority of ranking in the country.

### Review of literature Previous studies

Some of the popular research that examines ranking of companies based on financial and non-

financial information and a separating of the successes and failures can be traced to the following: In 2000, a study in the United States by Redman, Arnold and Goulet 1 on seven portfolio was performed using index Sharpe, Treynor and Jensen's alpha. Research results are for two period of years 1989 - 1985 and 1994 - 1990 showed that the ranking obtained from two criteria Sharp and Trainor for four portfolios were exactly the same. It represents that efficiency obtained with total risk and systematic risk has similar results and therefore the total risk is close to systemic risk.

In 2000, Petrovsky performed an investigation to separate successful companies of unsuccessful companies. The Question of researcher was this, that is it possible using fundamental analysis-based accounting, of companies that have a high ratio of book value to market price, we give the higher returns? This study showed that the use of stem symptoms for companies that have a high ratio of book value to market price causes a change in the distribution of returns is skewed 3. He showed that companies that have strong foundation and also have a the ratio of book value to market price higher and on average have won higher returns and for the ranking companies used of index F (Mehran, 1383, p. 82).

Johnson and Svn in 2003 in their study concluded that between ranking based on Economic

value added criteria to evaluate the performance of companies, Sharpe ratio and Jensen's alpha and financial criteria such as company size, the ratio of book value to market value, sales growth rate, capital structure, liquidity, cash conversion cycle, changes in profitability and return on assets, there is a significant relationship. In 2007, a study by Ying Becker, Harold Fox and Pong as a functional study of the multi-algorithms for ranking stocks has been done, so that quantitative models of portfolio management and stock in order to determine the most important factors and how their react are specified. Genetic Programming using simple purpose and function shown effective techniques with optional criteria and create models with multiple factors to rank stocks have created.

Stefano Malagvly and colleagues in 2007 conducted a study on the ranking business units using fuzzy models and qualitative and quantitative variables. The criteria used include twenty-one variable that are based on the strategic goals of the company such as assets and financial performance, assessing the quality of management performance and the competitive situation. Qdrtyan in 1383 on his research, designs a comprehensive model for the performance evaluation and ranking companies. His proposed model based on the balanced assessment has been designed, but has major differences with it, that is in addition to the four components of the balanced assessment has two components, including human resources, and 422 performance indicators are derived based on 6 factors of model for evaluate and ranking. He used in his study of several indicators decision making model and TOPSIS techniques and Shannon entropy model

#### Research hypotheses

##### The main hypotheses:

**First hypothesis:** accounting variables are effective in enhancing corporate performance.

**Second hypothesis:** non-accounting variables are effective in enhancing corporate performance.

##### Subsidiary hypotheses:

##### Hypotheses

**First hypothesis:** the cash conversion cycle is effective in enhancing the performance of companies.

**The second hypothesis:** Liquidity is effective in enhancing the performance of companies.

**The third hypothesis:** capital structure is effective in enhancing the performance of companies.

**The fourth hypothesis:** return on assets is effective in enhancing the performance of companies.

**Fifth hypothesis:** the size of the company is effective in enhancing the performance of companies.

**Sixth hypothesis:** the Sharpe ratio is effective in enhancing the performance of companies.

**Seventh hypothesis:** the ratio Trainor is effective in increasing the company's performance.

**Eighth hypothesis:** Jensen's alpha is effective in enhancing the performance of companies.

**Ninth thesis:** Economic value added in enhancing the performance of companies is effectively.

#### The statistical population

The sample size this study consisted of 50 companies in the Tehran Stock Exchange in the first quarter of 1390, which information related to them was available and in the form (3-1) have shown.

#### Economic value added

This standard is method of measuring the economic value of a business after taking into account capital costs, including the cost of debt and cost of equity. Economic value added is equal to the operating net profit after taxes minus the cost of capital employed (Stewart, 1991). Taking into account the economic value as a measure of performance evaluation, good activity is activity that will lead to positive economic value added.

#### Jensen's alpha

This coefficient is indicate difference between actual returns and expected returns due to the capital asset pricing model. This coefficient is determined by the following formula:

Jensen's alpha = rate of return assumed {beta coefficient × (rate of return without risk-return market) + rate of return without risk}

#### Sharpe Ratio

This ratio represents the amount of the company's excess return that company can give the risk-free return given the total risk of the company. The index is calculated by the following formula:

$$S_i = \frac{r_i - r_f}{\sigma_{ri}}$$

$S_t$  = company's sharp index

$r_t$  = risk-free return

$\sigma_{r1}$  = The standard deviation of returns

#### Trainor ratio

This index in fact represents this matter that for every one unit of systematic risk been awarded how much excess return to an investor gets, and how much the risk-free return divided by the Exchange Ratio is desired (Islamic Bidgoli 1384, p. 6).

#### Return on assets

This ratio expresses the company's output is compared with the volume of assets acquired and is determined according to the following formula:

$$RoA = \frac{NetRofit}{TotalAsset}$$

RoA= Return on assets

### Liquidity

This index as having sufficient cash to meet immediate investment opportunities is intended and be defined as follows:

$$LIQ = \frac{Cash + NearCashAssets}{TotalAssets}$$

LIQ= Liquidity Ratio

Cash= amount of cash

NearCash= Assets near to cash such Exchange

TotalAsset= total value of company's assets

### Capital Structure

$$CCC = \frac{(Inventories + Accounts Receivable - Accounts Payable) * 360}{Sales}$$

### Tools and methods of data collection of research

Data gathering for each type of study is important. Scientific research based on methods of collecting data are divided in three kinds of laboratory experiences, field study and survey research. The research method used for this study, is a survey (fieldwork), because for collecting information in the field of literature with reading books and articles, in websites, CDs Enterprises notification and exchange services, process management Softwares and new outcomes, needed information were gathered and then applying mathematical models TOPSIS to rank superior companies in terms of stock exchange indexes accounting and non-accounting have achieved.

### The research model

In scientific research, there are two main approaches in relation to the methodology ranking, single-criteria decision-making methods and the methods of multi-criteria decision. In recent two decades attention to these models in complex decision making, has been very high. The one criteria decision is also based a criteria of decision-making. If there are more than one criteria, is called multi-criteria decision. Rating model used for this study is TOPSIS.

And a model that also used in this study to test the hypothesis is Spearman correlation coefficient. This test is used when that the data are of type of rating and sizes of variables are set with form of rating. A model of this test is as follows:

### Formula

### Statistical methods for data analysis

This ratio expresses the company's use of debt in financing the funds are needed. Various formulas have been proposed for measuring the ratio. This index is defined as follows:

$$DebtRatio = \frac{TotalDebt}{TotalAsset}$$

### Cash conversion cycle

Cash conversion cycle is the amount of time that it takes to Cash spent on the purchase of raw materials and in the form of the cash to come back again and will be determined by the following formula:

After collecting information and measuring indicators, we use from Fuzzy Topsis method for the ranking companies operating in the Tehran Stock Exchange on the basis of non-accounting and accounting information. Fuzzy Topsis method is a very technical and strong decision-making method for prioritizing options through simulating the ideal solution. In this way, the selected option should be have the shortest distance from the ideal solution and farthest from the ineffective response. From other advantage of this method is combination and incorporation of quantitative and qualitative indicators for decision-making. Using the characteristics desired and by spreadsheet software (EXCEL) and software 1 SPSS, we solve the model and analyzing information and using the Spearman correlation coefficient, we compare the ranking obtained from TOPSIS method with ranking stock. Spearman rank correlation coefficient that is showed usually it with P mark, is always between 1 and -1, and in terms of level of measurement is arrangement. If our data are relative and interval so we can turn them into rank. No matter which is the dependent variable and Which is independent variable.

### Ratings and analysis of statistical sample firms

### Analysis of the main assumptions

- First hypothesis: accounting variables are effective in enhancing corporate performance.
- The second hypothesis: non-accounting variables are effective in enhancing corporate performance.

First hypothesis testing:

Table

Return on assets	Liquidity	Company's size	Cash conversion cycle	Capital Structure	index	Number
0.08	1.64	12.10	381.26	4.54	Investment Bou Ali	1
0.15	2.61	14.23	101.69	0.05	Contacts Iran	2
0.19	1.23	12.52	110.14	5.52	Investment Industry and Mine	3
0.27	1.59	12.28	178.48	0.07	Calcimine	4
8.18	0.81	12.39	86.80	0.01	Mehrcam Pars	5
0.72	0.47	7.41	93.24	0.23	Fars & Khuzestan Cement	6
0.26	5.56	12.62	370.52	3.15	National Development Investment	7
0.13	0.95	13.67	95.18	0.21	Ghadir Investment (Holding)	8
0.17	0.26	12.65	141.94	0.62	North Drilling	9
9.63	0.03	14.67	87.32	0.07	Tejarat Bank	10
0.38	2.63	13.54	270.32	0.08	National Iranian Copper Industries	11
0.18	0.72	12.03	65.00	0.04	Iran Behshahr Industrial Group	12
0.06	1.13	13.63	211.10	1.67	Bank	13
0.13	1.15	13.00	353.00	0.02	Iran Transfo	14
0.06	0.82	13.24	467.57	0.13	Iran Khodro Diesel	15
9.35	2.20	14.85	76.53	0.13	Mellat Bank	16
0.10	1.19	12.26	61.65	0.06	Tolypers	17
0.38	7.24	13.08	245.66	0.02	Industrial minerals Chadormalu	18
0.03	1.37	12.20	208.00	0.02	Pharmaceutical JabrIbnHayan	19
0.17	3.61	12.50	266.33	1.79	Sepah Investment	20
0.08	3.02	12.46	49.27	0.48	Iran Industrial Development	21
0.05	0.06	12.51	48.89	0.06	Tuka Steel Investment (Holding)	22
0.01	0.49	12.55	163.22	0.09	Cement North	23
0.09	1.05	11.46	72.80	0.07	Hello Farsyt factory	24
0.08	1.21	11.45	1.73	0.05	Sahand Rubber	25

Return on assets	Liquidity	Company's size	Cash conversion cycle	Capital Structure	index	Number
0.11	1.30	12.46	118.45	0.74	Car parts Iran	26
0.06	0.72	13.19	428.00	0.02	Behshahr Industrial Development (Holding)	27
0.06	0.05	12.00	181.17	0.05	Electric Vehicle East	28
0.17	6.31	11.90	169.16	8.37	Pars Investment luggage	29
3.78	5.50	7.68	568.00	2.20	Bank Sinai	30
6.66	1.13	12.32	270.40	0.16	Azarab industry	31
0.04	1.32	12.33	216.48	0.04	Telecommunication cables martyr sugar	32
0.27	2.25	11.52	130.45	1.70	Investment campus	33
0.09	1.37	12.80	82.50	0.02	Housing Investment	34
0.13	0.04	12.92	68.74	0.32	Tehran Cement	35
0.26	0.62	8.14	80.46	0.03	Bank of New Economy	36
0.95	0.74	11.84	323.35	0.04	Iran Construction Investment	37
0.24	0.73	11.91	173.92	3.10	Luqman machinery	38
0.18	1.28	12.57	177.72	0.06	Iran Zinc Mines	39
0.25	1.57	11.70	108.84	0.07	Iran digits	40
0.09	1.80	12.93	122.77	0.08	Alborz Investment (Holding)	41
0.29	2.06	12.78	205.25	0.03	Information Services	42
0.43	4.39	12.13	598.37	0.21	Insurance Investment	43
0.46	1.15	13.50	345.89	0.53	Isfahan Oil Refinery	44
0.38	1.02	12.80	171.75	0.03	GolGohar Iron Ore	45
2.64	0.73	12.12	90.93	0.22	Cement West	46
0.63	0.63	13.93	74.40	0.07	Pars Oil	47
0.08	1.20	12.41	66.39	0.11	Isfahan Petrochemical	48
0.22	0.85	13.12	25.10	0.19	The development of minerals and metals	49
0.02	1.00	11.94	54.93	0.08	SaipaAzin	50

The first hypothesis investigates the effect of accounting variables to enhance the performance of companies with TOPSIS method :

The first phase of the data matrix:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

At this stage in possession of information on the rating of companies in the stock and accounting factors considered in this study (both attached) we form data matrix in table (4-1).

### The results of testing hypotheses

#### The main hypothesis test results

✓ In the first, we studied the effects of accounting variables (the cash conversion cycle, liquidity, capital structure, return on assets, the size of the company) in increasing of companies' performance (the top 50 ranking list released by the Tehran Stock Exchange ) and with studying of the correlation between ratings obtained from companies based on accounting variables, by TOPSIS technique to rank companies based on accounting variables Tehran Stock Exchange, using SPSS software and Spearman test showed that accounting variables in enhancing corporate performance are effective.

✓ Then in the second hypothesis, we studied the effects of non-accounting variables on increasing of companies' performance (the top 50 ranking list released by the Tehran Stock Exchange ) and with studying of the correlation between ratings obtained from companies based on accounting variables, by TOPSIS technique to rank companies based on accounting variables Tehran Stock Exchange, using SPSS software and Spearman test showed that non-accounting variables in enhancing corporate performance are effective.

✓

#### Results of testing the subordinate hypothesis

According to results of testing the subordinate hypothesis about each the accounting standard indexes, we can say that :

Cash conversion cycle, Company's size and Capital Structure aren't effective on increasing of company's performance.

Return on assets and Liquidity Structure variables are effective on increasing of company's performance.

About each the non- accounting standard indexes, we can say that Sharpe Ratio variable and Trainor ratio variable aren't effective on increasing of

company's performance but Jensen's alpha and economic added value are effective on increasing of company's performance.

### Conclusion

A lot of researches also in this subject such as Senaie (1373), Fadaie Nezhad (1374) and Namazie approved that Tehran capital market is in weak level. Maybe one of reasons this weak level is gap between the ratings in Tehran capital market and the ratings based on standards in this research.

According to the significant relationship of rating based on accounting and non-accounting standards with rating based on symbols of stock exchange market, is specified that in stock exchange market, these variables have high validity for rating of companies and are suggested them for rating of companies.

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