

Ranking Model of Companies Listed In Tehran Stock Exchange by Financial Ratios Indicators

Hossein Azimi, Reza Pirayesh, Amir Eskandari VatanNahhad

Abstract— Stock exchange is the official market for buying and selling stock and other securities and has special rules and regulations. Ranking companies in this market will make weak companies of the industry, measure their distance from the best ones and codify suitable strategies to reach to them; and superior companies will strengthen their position by proper programs and strategies. The current study examines the relation between financial ratios and ranking of companies. In this study, based on data of 5 years from 2009 to 2013, 147 stock exchange companies were examined in 4 groups, including liquidity ratios, debt ratios, activity ratios, and profitability ratios. Market ratios were also included for a better assessment; then ranking was done for data of 5 years using ELCTERE model; The results show that ROE ratios, working capital return, current ratios, quick ratio, liquidity ratio, inventory turnover, price-to-earnings ratio, total assets turnover are more effective in ranking companies.

Index Terms— Financial ratios, ranking, ELCTRE, MADM.

I. INTRODUCTION

Stock exchange is the official market for buying and selling stock and other securities and has special rules and regulations. Most of economists introduce capital formation as the most important factor in economic development. Economic development in today's world, is Indebted to stock exchange and activities of capital market. The investors also, have always been looking for the best investment in order to gain more benefits. Therefore, they try to distinguish successful companies from unsuccessful companies and rank them. Financial ratios and performance indicators of successful companies are results of evolution of accounting and using financial ratios to analyze financial statements. The most important issue that investors face in financial markets, is choosing proper securities for investment and forming optimal stock portfolio. By considering financial ratios as assessment indicators, stock exchange companies as options and using multi criteria we can take action to financially evaluate and rank the companies. Decision making by incorporating various criteria that each one has a special place

Manuscript received July 29, 2015

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is only possible by using multivariate decision-making models. In this methods various indicators are used in accordance with ranking type. Existence of an active and thriving capital market is considered as an attribute of development of countries. The most important issue that investors face in financial markets, is choosing proper securities for investment and forming optimal stock portfolio. Investment process in a coherent manner, requires analysis of main essence of investments decisions. In this manner decision making process related activities are broken down and important factors in realm of investors activities that affect their decisions are examined (Tehrani, 2008).

This study aims to analyze and summarize copious amount of information related to various companies, and help investors in selection of proper stocks. In this paper we try to rank stock exchange companies of Tehran Stock Exchange and form an indicator portfolio of superior companies by making use of multi-criteria decision making models. ELCTERE method can be introduced as one of the best methods of solving decision making issues by multiple criteria. Among its advantages are simple rules, maximum use of decisions matrix information, and finally regular and coherent calculations.

II. A REVIEW OF THEORETICAL LITERATURE OF THE STUDY

2.1 Research literature

Decision making is one of the most important duties of management. One of the reasons for success of some individuals and organizations is making suitable decisions. All of us make conscious and unconscious decisions in our personal life. In other words, we choose a solution from among several solutions (Momeni, 2006).

Generally there is one or more decision making criteria such as profit, cost, desirability and undesirability in every decision problem under consideration. If the problem is about optimizing a goal or criterion, it is called single criteria, if there are more than one criterion under consideration of the decision maker, that is a multi-criteria decision making problem.

MCDM is abbreviation of Multiple Criteria Decision Making. MCDM is divided into two general categories: (A'alem Tabriz, 2002).

- ❖ Multiple objective decision making models (MODM).
- ❖ Multi-attribute decision making (MADM).

A. multiple objective decision making models (MODM):

In these models multiple objectives are under consideration simultaneously for optimization. In real world there are various decision making problems in form of MODM. For example, imagine during formation of portfolio, an investor wants to maximize his share of the stock while minimizing the risk, or a manager who on one hand wants to increase

employee satisfaction and on the other hand wants to minimize the costs of salaries.

B. multi-attribute decision making models (MADM):

General model of MADM that is the second group of multi-attribute decision making, mostly is concerned with issues where choosing an appropriate option is desired. In other words, in these models, choosing an option from among a series of options is in mind. Generally, MADM is referred to special decisions (Preferred) such as evaluation, prioritization or selection of an available option. For example, cost of constructing a highway by a local contractor is less than the other builders, but stability and quality of the foreign contractor's work is higher. Now assume that there is too many variables and other alternatives are considered for builders. This way, it's really hard to assign the job and traditional models of research are unable to solve such problems in operation. Because classical models, consider only one optimality criteria. High capability of different MADM methods and techniques in solving various problems (in terms of diverse goals, various conditions and limits, and various criteria affecting decisions ...) has led to more use of these models in various fields such as politics, urban planning, allocation of library resources, ranking the options, prediction, and decision making in general (A'adel Azar, 2011).

Different types of MADM share these common characteristics:

Options: in these problems a certain set of options should be examined and prioritized, chosen or ranked. These options can be limited or too many.

Multiple indicators: every MADM problem has several indicators that decision maker should make completely clear. Number of indicators depend on nature of the problem.

Scaleless units: every indicator has a different measuring scale than other indicators; therefore to make results and computations significant, we tried to make the data scaleless by scientific methods, in a way that relative importance of the data is maintained.

Weight of indicators: all MADM methods require information that is obtained based on relative importance of each indicator. The information usually have ordinal or major scales. AHP, TOPSIS, ELECTRE, and SAW techniques have a major scale. Relevant weights can be directly allocated to the criteria by decision maker or by available scientific methods. These weights express relative importance of each indicator. (AsgharPour, 2009).

2.2 Research Background

In 2000 Piotroske examined using information of financial statements to distinguish between successful and unsuccessful companies. His question was, is it possible to gain more return from companies with higher book value than market value using fundamental analysis based on accounting? The study showed that using fundamental signs for companies with higher book value than market value causes changes in skewness of return distribution and it also showed that companies that have strong fundamental signs and have higher book value than market value, averagely have gained higher returns. F-score was used for ranking companies. In his model, fundamental variables such as profit margin, shareholders return, etc. existed.

Keim, Donald B.& Robert F. Stambaugh (1986); Campbell, John Y (1987); Fama, Eugene & Kenneth French (1988); Hodrick, Robert J.(1992); and Campbell, John Y. & M.Yogo (2002) showed that financial ratios such as ratio of dividend to price, earnings to price ratio, and short-term interest rates can predict stock return rate.

Dater, Vinayt, N. Naik and R.Radcliffe (1998) examined and ranked effects of liquidity on stock return rate.

Lewellen, Jonathan (2003) examined power of financial ratios to predict stock returns. Olsen, Dennis & Charles Mossman (2003) examined prediction of stock returns using financial ratios.

Johnson & Soenon (2003) found that there is a significant relation between ranking companies based on criteria of performance evaluation, economic added value, Sharpe ratio and Jensen's alpha, financial ratios such as company size, book value to market value stock ratio, sustainable growth rate, capital structure, liquidity, earnings volatility, and return on assets rate. Chang ping chang (2006) used gray system approach for another study on ranking of commercial banks in Taiwan. In this study we ranked the banks under examination by using financial ratios as evaluation indicators. In another study by Mohanram in 2004 called distinguishing successful and unsuccessful companies, it was found that fundamental signals combined strategy for companies with low book value to market value can cause unusual return (Mehrani, 2004).

Min and Lee (2008) used data envelopment analysis for credit ranking.

To this end researchers used audited financial data of some manufacturing companies. They considered financial costs to sales ratio, current liabilities to assets ratio and total liabilities to total assets ratio as input and capital to total assets and current assets to current liabilities ratio as output of the pattern. Researchers believed that the research outcome including obtained credit rank by DEA is reliable and trustworthy. They also compared the results with results of other methods.

Chang et al (2007) aimed at introducing DEA method as another method of companies' credit ranking. First researchers described the method and how to use it as an appropriate method for credit ranking and then by numerical example showed that DEA is capable of credit ranking of commercial units.

Ghodratian (2004) designed a comprehensive model for performance evaluation and companies' ranking. His proposed model is designed based on balanced evaluation but has major differences with it. It means in addition to four elements under consideration, it takes two other elements including manpower and management into account, and so extracted 422 performance indicators for evaluation and ranking. He used multi-indicator decision making model and Shannon entropy techniques and models.

Mehrani (2004) examined the relation between financial variables and non-financial variables such as sales, net profit, return on equity, volume of trading, number of transactions, and stock return. The results showed that there is correlation between financial and non-financial and stock returns, also that successful companies earned more return than unsuccessful companies.

Anvari Rostami (2006) compared the two common ranking methods based on superiority indicators of Tehran Stock Exchange and accounting profitability ratios such as gross

profit ratio, operating profit ratio, Return on equity, etc. The Results suggests that there is a weak correlation between these two ranking groups and therefore superior stock exchange companies don't necessarily have higher rank in terms of profitability ratios.

Madani Mohammadi (2006) evaluated the performance of brokerage firms and codified a model to rank them based on TOPSIS technique. He found out that components such as financial component, customers, internal process, development and innovation, manpower and management are effective in brokerage firms ranking but there is no priority in this regard.

Fazli and Mansouri (2007) in another study ranked key indicators in decision making about buying and selling shares by DEA and hierarchical analysis process.

In his paper called "choosing portfolio by multi-criteria decision making" Janani et al (2008) first calculated weight of criteria by eigenvector method and then chose portfolio through TOPSIS method. They used 10 criteria in their paper including: capital return rate, earnings per share, price-to-earnings ratio, systematic risk (beta), return on assets rate, current ratio, etc.

Delbari (2001), in his study called "examination of effective criteria on stock option in Tehran Stock Exchange based on analytic hierarchical process" studied effective criteria on stock selection. Effective criteria used in this paper are in two groups. The first group called main analysis includes: price-to-earnings ratio, earnings per share, dividend per share, ratio of market value to book value per share, price-to-sales ratio, debt-to-capital ratio, return on asset rate, ROE rate, investment market, and the second group called technical analysis, including: stock price trend, stock benefit trend, dividend trend, volume of trading, total market orientation, and moving average. He first identified effective indicators on stock selection and then weighted indicators by analytic hierarchical process.

Ahmadpour et al (2009) in their paper called "using multi indicator decision making models in stock selection of pharmaceutical companies listed in Tehran Stock Exchange" used twelve effective criteria including: price-to-earnings ratio, earnings per share, dividend per share, ratio of market value to book value per share, price-to-sales ratio, debt to equity ratio, return on assets, return on equity, investment market, volume of trading, dividend trend, disclosure and transparency of information

Akrami (1995) in his thesis called "examination of use of financial statements analysis techniques and their role in investors decision making" studied role of different financial ratios in decision making of investors. The examined criteria include: profitability ratios, liquidity ratios, financial leverage ratios (investment), activity ratios, market ratios, trend analysis.

MirGhafouri et al (2009) in his paper called "application of fuzzy analytic hierarchical process in prioritizing effective factors in stock selection in Tehran Stock Exchange from viewpoint of shareholders" identified effective criteria on stock selection and then prioritized the identified criteria by Fuzzy AHP method.

III. METHODOLOGY AND TOOLS AND TECHNIQUES

This study aims to examine effective criteria on stock selection by using multi-indicator decision making algorithm in companies listed in Tehran Stock Exchange. Time period of this research is between 2009 and 2013. The statistical population is all of the companies listed in Tehran Stock Exchange in the period between 2009 and 2013. The statistical sample includes 147 of the companies listed in Tehran Stock Exchange in the period between 2009 and 2013. Sampling type was systematic and the following were under consideration:

Two issues were considered in sampling.

First, the sample should be a desirable representative of the population.

Second, the sample should be in proportion with basic variables. Based on this, the samples were chosen according to the following criteria:

They should not be among banks, insurance institutions and financial brokering and investment companies.

They should be listed in Tehran Stock Exchange before 2005. Company symbol should not be closed for more than six month.

Financial statements should be available for all years.

Information Analysis Methods

✓ ELECTRE technique

ELECTRE technique is one of the most important compensatory strategies that is in coordinated sub-groups. In this sub-group, outputs are a set of ranks, in a way that they will provide the required coordination in the most appropriate way. In ELECTRE technique instead of ranking, a new concept called outranking is used. For example $C_i \rightarrow C_k$ indicates that although k and l have no mathematical priority in relation to one another, but risk decision maker accepts priority of C_k . In this method all of the options are evaluated by outranking comparisons in order to eliminate ineffective options. Paired comparisons are tested based on degree of agreement with W_j weights and degree of difference from options assessment values. These steps are based on a coordinated set and an uncoordinated set that is known as "coordination analysis method" (Asgharpour, 2008).

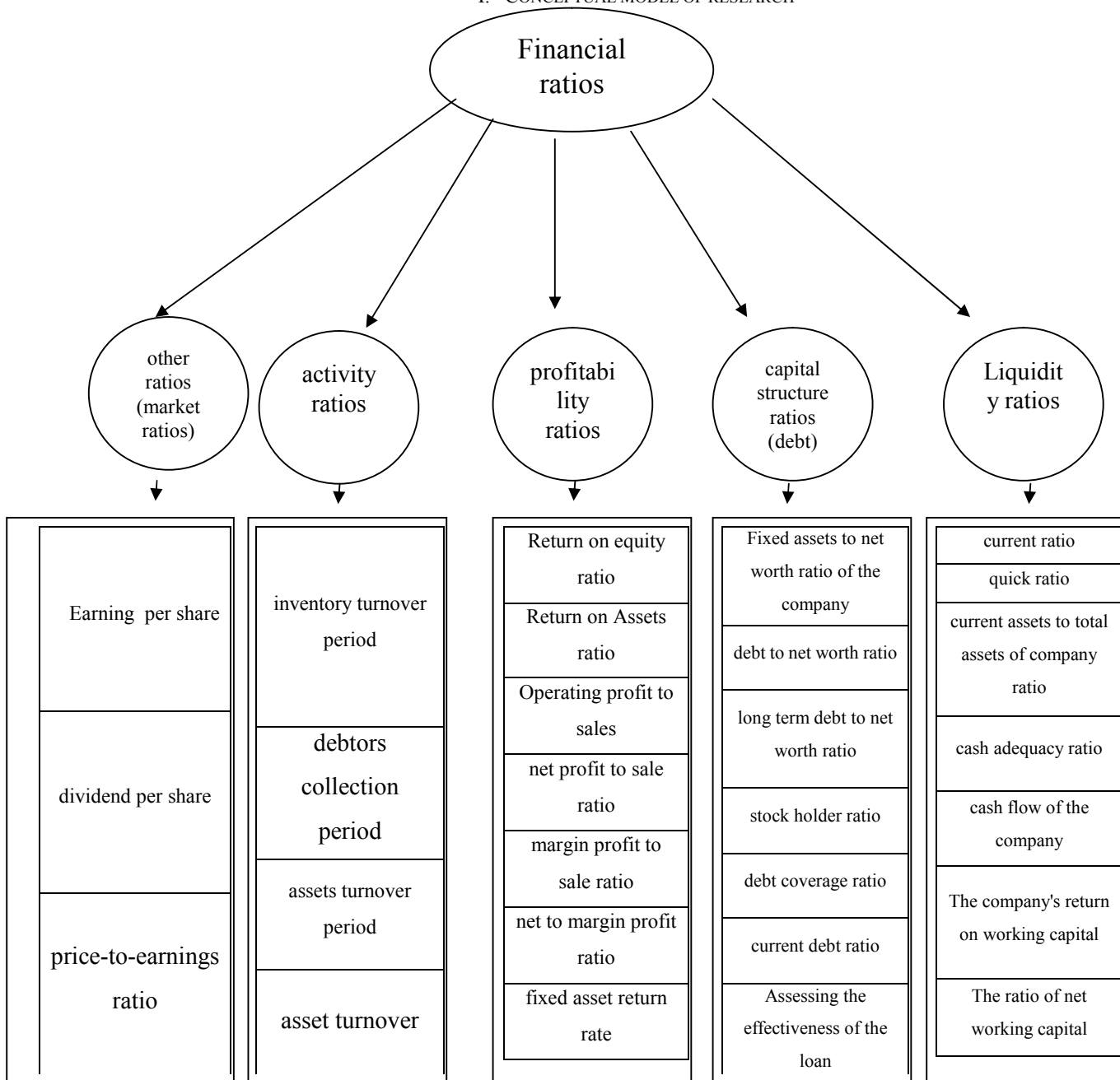
IV. DATA ANALYSIS

Evaluation of weights of indicators

Every problem that decision maker encounters, may include several indicators. Therefore it's important to ((know the relative importance of the indicators)). So a weight is assigned to each indicator, in a way that total weights of indicators would equal one. These weights show the relative importance of each indicator in relation to others. We used entropy method for evaluation. The idea is that the higher the dispersion in one values of indicator, more important is that indicator.

In information theory, entropy is an uncertainty criterion that is shown by pi (Momeni, 2006).

I. CONCEPTUAL MODEL OF RESEARCH



The summary of consolidated model is presented in the table below. It includes multiple values that show ratio of variability of y values which can be stated by fitted line by model. Here correlation equals 1. The next statistic is coefficient of determination that in fact shows total percent of variability. Next statistics are adjusted coefficient of determination and remaining standard deviation.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000 ^a	1.000	1.000	.00587

Next output of the analysis is presented in table below that is related to ANOVA regression that tests linearity of variables. In this equation, the obtained F value is not significant and the assumption of their linearity is confirmed.

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	18.034	27	.668	1.940E4	.000
Residual	.004	120	.000		
Total	18.038 ^b	147			

The table below includes fixed and regression coefficients, thus we can show the regression equation as follows:
 $Y = .383 + 2.214A + 2.3024C - .2541D + 3.2145E + 3.521F + 5.3486G + 8.02H + 6.365I + .011K + .006L + .001P + .001T + .279X - .013AA + .001AB + .003AC$

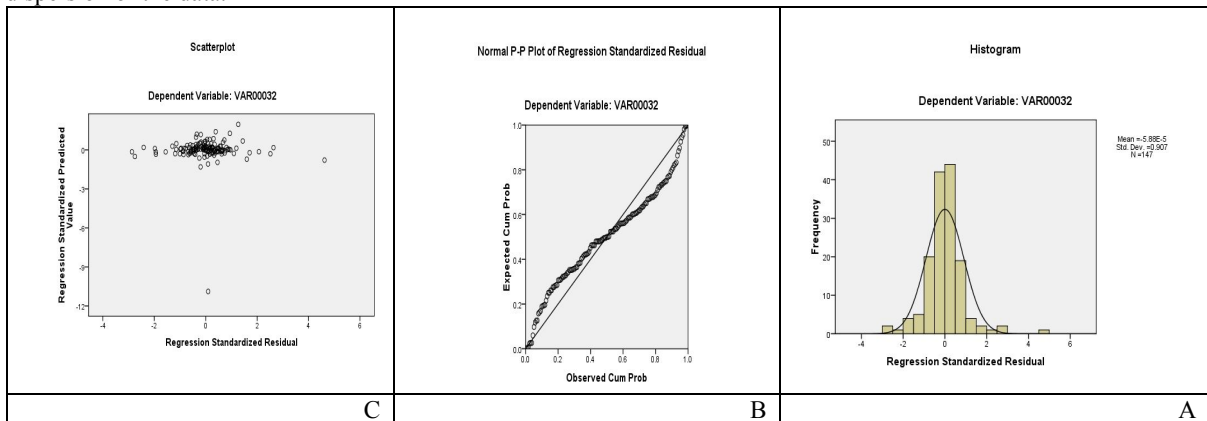
In which Std. Error shows regression coefficients criterion. B shows the coefficient size of each variable. Also Beta shows the rate of change of response variable for a standard deviation in independent variable. T test is for testing regression coefficient and Sig. shows the p-value for t.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Net profit to sales	2.21456	.000	.011	3.364	0.001
Operating profit	2.30240	.000	.016	3.491	0.019
Margin profit to sales	.000	.000	.035	3.109	0.002
Profit to margin sales	3.21546	.000	.007	4.116	0
ROA	3.254	.000	.019	3.146	0.002
ROE	5.3486	.000	-.001	-.366	0.015
Working capital return	8.0296	.000	.152	13.235	0
EPS	6.3652	.000	-.006	-3.819	0
Current ratio	.011	.002	.044	5.214	0
Quick ratio	.006	.003	.017	2.282	0.024
DPS	.024	.005	.015	4.797	0
Current asset ratio	.010	.005	.019	1.914	0.058
Cash adequacy ratio	.001	.001	.001	.583	0.561
Price to earning	.010	.003	.017	3.205	0.002
Special working capital	2.125	.000	.002	.992	0.323
Inventory turnover	6.642	.000	.004	1.437	0.153
Collection period	-2.362	.000	-.005	-1.489	0.139
Price to earnings ratio	.001	.000	.063	4.325	0
Cash flow ratio	.000	.000	.060	2.965	0.004
Company asset rate	.004	.001	.012	2.930	0.004
Debt ratio	.279	.004	.546	79.064	0
Fix asset to net value ratio	.002	.001	.050	4.322	0
Long-term debt to net value	-.013	.001	-.134	-11.537	0
Current debt to net value ratio	.001	.000	.027	4.168	0
Stock holder ratio	.003	.000	.326	49.574	0
Debt coverage ratio	.000	.000	-.008	-5.145	0

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Ratio of financial burden of the loan	.000	.000	.048	1.453	0.149
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Diagram A shows the normality of the data. Diagram B shows the distribution of data around the fitted line, and diagram C shows dispersion of the data.



Descriptive statistics of data integration of 5 years is as follows in case of integration within the group.

Descriptive Statistics			
	Mean	Std. Deviation	N
Dependent variable	.3342	.10532	147
profitability	5.2135E2	7578.81908	147
liquidity	4.6205	15.75410	147
Activity	-6.6847E4	2.47971E6	147
Debt	63.6133	70.61277	147
Other ratios	8.7304E2	3468.45843	147

Intergroup correlation of 5 groups under consideration is represented in table below.

correlation	Correlations						
		Dependent variable	profitability	liquidity	Activity	Debt	Other ratios
Pearson Correlation	Dependent variable	1.000	.842	-.141	.113	.114	.079
	profitability	.842	1.000	.003	.053	.043	.480
	liquidity	-.141	.003	1.000	-.017	.628	.004
	Activity	.113	.053	-.017	1.000	.133	.026
	Debt	.114	.043	.628	.133	1.000	.127
	Other ratios	.079	.480	.004	.026	.127	1.000

The table below shows a summary of data integration of 5 years. It includes multiple values that shows variability ratio of y values that can be stated by the line fitted by the model. Here correlation is .97. The next statistic is coefficient of determination that in fact shows the percent of total variability. Next are adjusted coefficient of determination and remaining standard deviation.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.971	.943	.941	.02552

The next output of the analysis for integrated sub-group data of 5 years is presented in table below that is related to ANOVA regression that tests linearity of variables. In this equation, the obtained F value is not significant and the assumption of their linearity is confirmed.

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1.528	5	.306	469.036	.000 ^a

Residual	.092	141	.001		
Total	1.620	146			

The table below includes fixed and regression coefficients, thus we can show the regression equation as follows:
 $Y = .317 + 3.9897A + 2.698B + 2.6985D + .4293E$

In which Std. Error shows regression coefficients criterion. B shows the coefficient size of each variable. Also Beta shows the rate of change of response variable for a standard deviation in independent variable. T test is for testing regression coefficient and Sig. shows the p-value for t.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.317	.003	0	106.600	0
	profitability	3.9897	.000	1.053	5.978	0
	Liquidity	2.698	.000	-.365	3.985	0
	Activity	6.588	.000	.016	.759	0.449
	Debt	2.6985	.000	.356	3.401	0
	Other ratios	3.429	.000	-.470	2.325	0

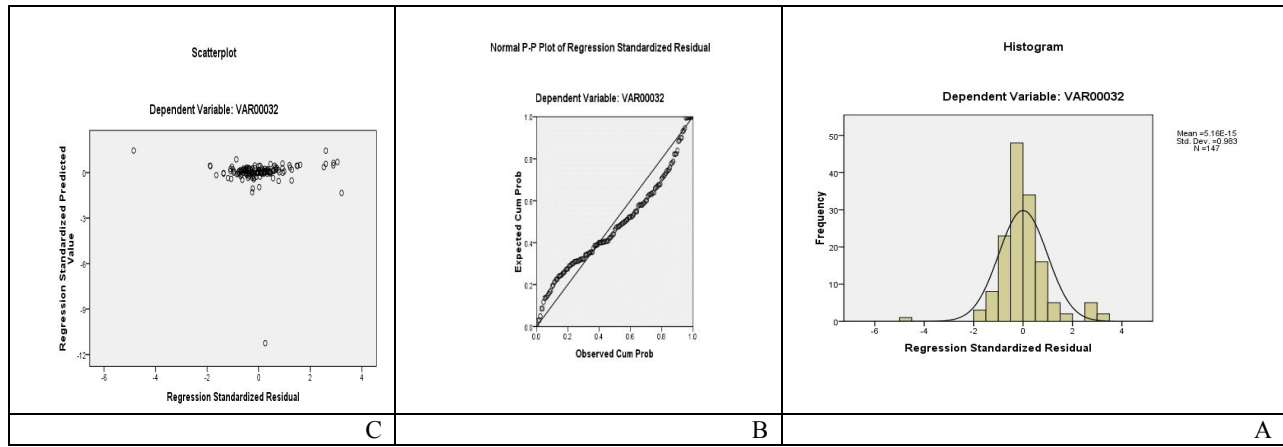
Therefore the most important ratios is profitability; debt ratios are in second rank, liquidity ratios stand in third rank, and finally these is market ratios.

Also, results of ranking subset groups of ratios includes:

Number	Ratio	Number	Proportion
1	Working capital return	16	company asset rate
2	inventory turnover	17	stock holder ratio
3	DPS	18	fixed asset to net worth ratio
4	Return on equity	19	Cash adequacy ratio
5	return on assets	20	price-to-earnings ratio
6	net to margin profit ratio	21	debt to net worth ratio
7	operating profit	22	Margin profit to sales ratio
8	net profit to sale ratio	23	cash flow
9	special working capital	24	debt coverage ratio
10	Debt ratio	25	The financial burden of loans
11	divided profit	26	debt to net worth ratio
12	current ratio	27	gross profit to sale
13	current asset ratio	27	fixed assets turnover
14	price-to-earnings	29	long term debt to net worth ratio
15	quick ratio	30	debtors collection period

Diagram A shows the normality of the data. Diagram B shows the distribution of data around the fitted line, and diagram C shows dispersion of the data.

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Integrated ranking of companies by ELECTERE method

Integrated results in ELECTERE model for 5-year is shown in the table below.

Integrated Results in ELECTERE model

Weight	Company Name	Row	Rank	Weight	Company Name	Row	Rank
30	nab	16	75	5	Ghand shirin khorasan	30	1
30	Faravari mavad madani	52	76	6	Ghand sabet khorasan	32	2
30]charkheshghar	101	77	6	Madani damavand	36	3
31	Naft pars	13	78	6	italran	63	4
31	Siman isfahan	84	79	9	Shekar shahrod	23	5
32	Labaniyat pak	19	80	9	Lole va mashin sazi	44	6
32	Folad amirkabir kashan	46	81	10	Saze poyesh	116	7
33	Siman oromiye	71	82	11	Maaden manganez iran	38	8
33	Mehvar khodro	102	83	12	Irka part sanat	113	9
33	Pars daro	145	84	13	Ghand torbat jam	31	10
34	Kasha sina	3	85	13	Farsit ahvaz	65	11
34	Siman hormozgan	82	86	13	Ringsazi mashhad	100	12
34	Elekterik khodro shargh	107	87	14	Pegah isfahan	18	13
34	Sina daro	123	88	14	sahd	28	14
34	Daro loghman	128	89	14	Navard alominyam	62	15
34	Darosazi kosar	137	90	14	Sanaye rikhtegari	112	16
34	Daro razak	141	91	15	Labaniyat kalbar	22	17
35	Maden roye iran	40	92	15	Ghand neyshabor	29	18
35	Melli sorbo roy	59	93	15	Siman shahrod	77	19
35	Fromolibeden kerman	61	94	15	Nasir mashin	105	20
35	Mehrgam pars	103	95	15	Radiator iran	109	21
35	Alborz daro	124	96	15	Lent tormaz	110	22
35	Mavad daro pakhsh	127	97	15	Ahangari teraktor	114	23
36	bama	37	98	15	Iran yasa	118	24
36	Sanati sepahan	42	99	15	Roz daro	126	25

36	sepanta	50	100	16	Ghand hegmatan	24	26
36	Siman hegmatan	70	101	16	Tehran daro	131	27
36	Daro jaberebn hayan	132	102	17	Kasha sadi	10	28
36	Daro sobhan	147	103	17	Siman khash	67	29
37	Tajhizat sadid	48	104	17	Kimiya daro	139	30
37	Siman arta ardabil	74	105	18	Iran daro	125	31
38	margarin	15	106	19	Pegah khorasan	20	32
38	Frosilis iran	45	107	19	Ghand naghshejahani	26	33
38	Siman shargh	86	108	19	Komakfanar indramin	97	34
38	Irankhodro dizel	94	109	19	Saypa azin	106	35
38	saypadizel	95	110	19	Karkhanejat daro paksh	143	36
38	Ghataate onimobil	117	111	20	Kasha hafez	1	37
38	Artavil tayer	121	112	20	alometek	60	38
38	Daro farabi	140	113	21	behsaram	5	39
39	Kashi takseram	4	114	21	Navard ghataat foladi	41	40
39	Siman sofiyan	76	115	21	Rikhtegari teraktor	111	41
39	Sanati barez	119	116	22	Kasha pars	7	42
39	Kavir tayer	120	117	22	Fanarsazi khavar	108	43
39	Daro paksh	146	118	22	Daro abo reyhan	134	44
40	Naft behran	12	119	22	Shimi daro paksh	135	45
40	Tose sanaye behshahr	17	120	23	Kashi isfahan	2	46
41	Sanati behshahr	14	121	23	Ghand lorestan	27	47
41	Folad kavian	47	122	23	Faravarde tazrighi	130	48
41	Pars khodro	90	123	24	Mes bahonar	58	49
42	Madene bafgh	39	124	24	azerit	64	50
42	Folad mobarake isfahan	43	125	24	Siman ilam	75	51
42	Alominyom iran	56	126	24	Siman darab	79	52
42	kalsimin	57	127	24	Siman dashtestan	88	53
43	Gorohe sanati sadid	49	128	25	Motorsazi teraktor	91	54
43	Siman tehtan	85	129	26	Ghand piran shahr	25	55
43	Goroh bahman	96	130	26	Siman bijnod	73	56
43	zamiyad	99	131	26	Daro eksir	144	57
44	Ghol gohar	34	132	27	Kashi alvand	8	58
44	Folad khorasan	51	133	27	Kashi nilo	9	59
44	Fanarsazi zar	115	134	27	Ghand marvdasht	33	60
46	Chadermalo	35	135	27	Siman kerman	83	61
47	Folad khozestan	53	136	27	Siman sepahan	89	62
47	alomorad	54	137	27	Tehran shimi	138	63
47	Melli sanaye mes iran	55	138	28	Siman ghaen	69	64

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47	saypa	92	139	28	Daro zahravi	122	65
48	Palayesh naft isfahan	11	140	28	Daro abidi	129	66
48	Iran khodro	93	141	28	Daro osve	136	67
55	Siman farsno	72	142	29	Peghah azarbajejan	21	68
66	Siman shomal	87	143	29	Siman fars	66	69
76	Daro damelran razak	142	144	29	Siman mazandaran	68	70
80	Siman fars va khozestan	78	145	29	Siman karon	80	71
89	Niro mohareke	104	146	29	Siman garb	81	72
93	mehvarsazan	98	147	29	Daro amin	133	73
				30	Chini iran	6	74

CONCLUSIONS AND SUGGESTIONS

According to these tests that were performed on available hypotheses, now we examine the summary of results.

The following are the results of hypothesis testing based on integrated data:

❖ Liquidity ratio are effective in stock selection.

The argument is that if a company wasn't able to supply its daily needs from current assets, or if it couldn't perform its short-term obligations in order to implement corporate goals, or if their inventory's liquidity face some problems, these issues will cause problems for company's long term activities; this also will decrease company's credibility due to failure in accomplishing short-term obligations. This in turn will increase company's financing costs that will lead to decrease of profit and this cycle will lower company's stock value and its credit ranking.

❖ Activity ratios are effective in stock selection.

The argument is that companies whose activity ratios are far from industry, can't be proper choices for investment, because, in these companies most of resources are left useless or its assets aren't appropriate for manufacturing goals of the company, or the sales policies are not effective and efficient. Another reason can be existence of a monopolistic market of raw material. Another reason can be high number of producers in the industry and competitive markets that will decrease these ratios.

❖ Capital structure ratios (debt) are effective in stock selection.

Creditors focus on the capital rate that is provided by shareholders. Because if share of shareholders is less than share of creditors the creditors will be exposed to company's risk. Financing by receiving loan causes the shareholders to gain more profit by having more control over company tasks and desirable investment. By increase of debts, interest costs increase and if interest costs and degree of those debts is too much, probability of stopping and bankruptcy also increases. If the company could make use of the debts in desirable investments, and the return of these investments were more than the interest of the debts, then wealth of shareholders will also increase.

Company assets, has the main role in making profit. The more efficiently the assets are used, the more profitable will the company be. The higher this return, the better is the company's use of assets and resources. Return on total assets ratio is used to assess the adequacy and efficiency of

management in effective use of assets and facilities that they have been granted from investments in companies. The argument is that these ratios are among the more available and in focus ratios, and ratios such as dividend rate, predicted earnings, etc. are always under investors' attention. That's why this group of ratios are effective in stock selection of investors. The other argument is that capital structure ratios are among the most important and effective ratios in financial world. Financial leverage can be considered as the most effective ratio in stock selection. These ratios are very important for investors because they justify company's financing and financial and commercial risk of the company.

❖ Profitability ratio are effective in stock selection.

One of the important indicators of financial health and efficiency of management is company's ability in making acceptable profit and or satisfactory return on its investment. It is obvious that investors aren't interested in participation in a company that has weak profitability. Because little profitability has negative impact on stock price, and company's potential ability in payment of dividends. Also creditors won't be satisfied by loaning to a company that has weak stance in terms of profitability, because it bears the risk that they will never be able to repay.

Profitability ratios are used in evaluation of executive operations of the companies. Profitability ratios can assess the company's success in acquiring profit and loss and net returns in relation to income and sales or in relation to investment. Profitability ratios assess total performance of company and efficiency of management in acquiring proper benefit. The argument is that investors focus their attention on profitability of shares, this puts companies with highest profitability in the spotlight and demand for their shares increases that will in turn attract individuals. That's why these ratios are among important ratios for stock selection.

❖ Market ratios are effective in stock selection.

Creditors focus their attention on the dividend rate and the benefit that company makes. Because people outside of the company give their money to a company that can gain more benefits, or one that is generally beneficial, otherwise creditors are open to risks of the company. The profitability of the company, plays a major role in the growth of the company. The more the profitability, the less the financing cost for company, and the easier receiving loan from creditors and financing. The argument is that these market ratios are among the more available and in focus ratios, and ratios such as

dividend rate, predicted earnings price-to-earnings ratio, etc. are always under investors' attention. That is why this group of ratios are very effective in stock selection by investors. The other argument is that market ratios are the most important and effective ratios of the financial world. Price-to-earnings ratio can be considered as the most effective ratio in stock selection. These ratios are very important for investors, because they reflect the most up-to-date information about companies.

Ratios with higher impact on ranking

The outcome of regression equations give us financial ratios with higher impact, and important financial ratios of 5 years include: Margin profit to sales, return on equity, and return on working capital, current ratios, quick ratios, liquidity ratios, total assets turnover, price-to-earnings ratio, and total assets turnover.

Research Suggestions

What's important now, is using research findings for investment in stock exchange. We should admit that, not all of the scientific researches, necessarily have objective application, especially in liberal arts that haven't been organized fully based on intellectual foundations, and human behavior and decisions are different based on environmental conditions. Here we don't intend to have a comprehensive discussion about decision making process in investment. Our suggestions are only in line with the research topic and so investment decisions should be taken according to all angles and requirements.

Therefore, we have two suggestions for natural and legal persons in stock exchange that intend to form a portfolio of shares:

❖ Employment of proposed method for optimization of investment portfolio:

Based on the importance of weighting in investment portfolio formation and also the effect that weighting can have on portfolio efficiency, we can't only draw on weighting method that was suggested to natural and legal persons that keep a portfolio of the stock. Rather, other evaluation and optimization models should be used.

❖ Enforcement of the proposed method to select the best stock and form a portfolio: The results of return comparison and results of the model show that using only fundamental data for formation of portfolio and taking advantage of the market opportunities can't be an appropriate solution in our inflationary conditions and young economy.

Suggestions for future research

✓ Adding new criteria such as liquidity, floating shares, base size, and halt duration of trading symbol can increase effectiveness of the model.

✓ Using qualitative criteria such as company image and brand in the model can increase effectiveness of the model.

✓ Using other decision making techniques such as Fuzzy SAW and Fuzzy ELCTERE, and evaluation of their effectiveness in comparison to techniques that are used in this study.

✓ Comparison of neural networks, expert systems, and artificial intelligence to determine the optimal portfolio of shares of companies.

✓ Using genetic algorithm and ant system to determine the optimal portfolio of stocks of companies.

✓ Using Fuzzy models for assessment of importance of financial ratios to determine the optimal portfolio of stocks of companies.

✓ Using Markov chain algorithm and nearest neighbor system to determine the optimal portfolio of stocks of companies.

✓ Comparing multi-criteria and multi-objective decision making models with fuzzy models to determine importance of each variable to determine the optimal portfolio of stocks of companies.

✓ Comparing neural network models with fuzzy models to determine the optimal portfolio of stocks of companies.

✓ Comparing genetic algorithm models with neural network models and determination the optimal portfolio of stocks of companies.

✓ Comparing genetic algorithm models with multi-criteria and multi-objective decision making and fuzzy models to determine the optimal portfolio of stocks of companies.

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