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## The Investigation and Explanation of Local Model of Effective Internal Factors on Stock Price Index in Tehran Stock Exchange with Fuzzy Approach

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**Abstract:** The goal of this research was an investigation and explanation of local model of internal effective factors on stock price index in Tehran Stock Exchange (ISE) with fuzzy approach. Based on, it was reviewed literature of stock price index in special. The statistical population and sample were 500 and 150 elements, data collection instruments were documents, interviews and specially questionnaire with reliability of 0.85 as nonexperimental survey research, to explanation of local model with emphasize on fuzzy and using SPSS v.15 and FuzzyTech v.5.61 software. The results showed in the entire internal factors, managerial, marketing and structural variables have the most effect on stock price index. Finally, it is presented concluding, discussion, implications for managers and directions for further research.

**Key words:** Stock exchange, stock price index, fuzzy, local model

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### INTRODUCTION

Index is a tool to measure and comparison the phenomenon's which have clear essence and properties. Therefore according to the index, created changes in determined variables can be studies during the period (Ghafari, 2004). Shares price index is using extensively in the society, according to the views of the investors for investing of special shares and also as one economical index from on the enormous economics. By the using feature, index is a quantitative instrument that is a representative of some homogenous variables. Today's scholarship is very important tools at investment market and has important rule on economic growing and by pricing, decreasing the risk, providing the source for economic improvement (Pakdin, 2008). Stock exchange is as a comprehensive and formal capital market which selling and buying the stocks of companies and governmental loan document or private institutes, that is done under some special rules. Special specification of the stock, scholarship is the center of collecting the reserved money and cash of private institutes, in order to providing financial for the long time project. In the another way there is a formal reference that on those who are looking for the safe place to invest in company or buying governmental loan document and have determined and

guarantee profit (Khodabakhsh, 2004). How to use the capital is important problem in per society, in an economic by the government sovereignty and huge investment appearance without correct management which is a guarantee for keeping the capital and increasing the capital sharing, but in economic according to the market, investment in per level appearance by quality management. Such managements are following capital profit and apply increasing. In market economic, governmental institutes tried to be private, while other institutes can make advantage. The main purpose of making private institutes is to increase the management of country sources by increasing the government rule and increasing rule private parts rule. Making huge market investment is another purpose of the creating the private institutes.

This action is done in Iran, first by presenting Tehran stock and if it isn't accepted, by governmental companies. Scholarship is the best way to attract the people's stopped and erratic cash, those who can't use their cash in the best way. They will be encouraged to save more money and spend little, indeed of their extent company in the units as an owner and have profit in the advantages of investment in the company and by attracting this cash and guiding it into the economic manufacturer and useful activity which will cause to improve the anti inflation

purposes. Also, scholarship is one of the instruments which is used to changing the companies with no profit (whether governmental or private) into the company with high profit.

Therefore studying the effective variables on stocks price changing at valuable documents scholarship has high importance which is because of that homogenous variable with stock natural way and cause to decrease the price indicator and stock stagnancy.

Stock is a French word which as all other related words, is inserted in Farsi (Persian) culture and in French literature it mean's wallet. But today this magic word has more important concept than wallet and is a measure and main index in our country's economic. Its importance is critical by some views and by studying each of them we can understand its rule on economic, private institutes and sometimes government need private institutes for the needed capital on their project and it is the reason for buying this share. When the sharing happened, a document is given to the stock holder which is named share. Therefore according to the changing in stick price and proper evaluation, the organization of stock exchange is made and according to the offer and demand, the companies' acceptable stock are priced and transacted.

This is important because little invests to be inclined on big actions and the money in private part is guided toward the individual and national profits. Index scholar is as temperature which shows the economics' situation of the capital market. Shares' price decreasing shows the economic stagnancy and its increasing shows economic improvement in America and its first using of shares happened at 1884. This indicator in railroad in dusty was taken by average 11. Totally shares price indicator in all capital market of the world is as one of the most important measurement for the action of stock exchange and attract importance and attention. Perhaps the most important reason for this attention is that mentioned index are governed by shares movement of all companies or special groups of existed companies and therefore it makes possible to study the way and measure of valuable movement in shares market.

Extending the theories and capital inventions at these lately decades was according to the general movement of the market and increasing the calculation and study of these index. Main and important using of index calculation of all market's output or specified variables of market in a special time and output using which is calculated, is as a basis for judgment about deferent portfolio. The main hypothesis on the action of portfolio is that investors are able to have more output in comparison to the market and random selection of the most extended shares or loan

documents of the all market. Therefore a manager by better action should be better than the market. Therefore shares index or loan documents can be a criterion for judgment about the action of investment managers. Also some kind of portfolio risks can be compared on the basis of risky index. Indicators are also for improvement and creating special portfolio for the most of the manager's investment is getting more output than market output in long time and it is permanently problem. At this way, investment in portfolio is one simple way which is compatible by portfolio market. This idea comes to creating the index boxes which aims to follow the market index action during the time; the price of shares shows the economic situation of company. Therefore market index shows the activity and situation of whole economy. Analyzers of the valuable documents, portfolio managers and the other economy in chargers, use the market index to study those variables which have effect on all the prices of the charges. Technological analyzers are those who likes indicator and believe that historical charges of prices can be used to predict the lately movement. According to the portfolio hypothesis and capital behavior it's described risk in relation to the capital that have risk and it is just a systematic risk. This risk describes the price of the purpose output with the output of the relationship market portfolio. Therefore it is necessary, when the systematic risk of a risky in relation with capital and, its output in index of the comprehensive market is calculated. Oscillation of shares price in the entire world is routine, not just normal, because the shares price and others kind o valuable documents shows all internal and external effective variables, therefore when special changing come into existence in effective variables, its reflection will be observed on shares price (Hamedian, 2000).

This is a necessity which guides different research. There is a meaningful relationship between the price of share and it is divided output. Also Jamshidi (1998) in a research got the liner relationship between outcome and shares price in the market of Tehran stock exchange. Hamedian (2000) concluded that psychic and political variables have high importance on decision making by the stockholders at Tehran stock. The price of shares is affected by the foreign currency price and inflation rate. Shares distribution has more effect on share price and long time loan has more effect than bank loan on the shares output. Shares' changing in the past has effect on investors' decision on buying the shares. The big shock has effect on shares price. Bordman and Claude (2000) find out that the size of the company has negative effect on shares price action; also different period has positive

effect on share price. Bartram (2007) concludes that changing of risk rate on shares price and cash is similar. Gammill and James (1988) concluded that most of the countries try to use of the Arbitrage opportunities. Bordman and Claude (2000) study the effect of different variables on the shares price and approved its effect on the depended variable. Therefore, these kind of the company size, golden shares and kind of the industry and period are different which at recent research we approved them as internal variables. Bihanot study the effect of government intrusion of shares price index and approved its affection. Therefore he insists on one side of the political- governmental variables. Olgun and Ozdemir (2007) concluded that S and P 500 permanently has effect on the shares price. Brown and Yucel (2002) found out the relationship between oil price and economic variables can be asymmetrical. Keane and Prasad (1996) found that increasing of oil price cause to decreasing the employment in short time and increasing the employment in long time. Ewing and Thompson (2007) get that the price of oil cause to the consumer price. Baharumshah *et al.* (2007) found that long term. Income hasn't meaningful elasticity as regards to the shares price on the demand of market's money. Sadorsky and Henriques (2007) find out the effect of the shares at technology companies has more effect on the price of the shares of energy (not oil) than the shock of the price oil.

Quah and Srinivasan (1999) knows five effective variables on the shares price as risk, growing, cash, momentum and output. Chang *et al.* (2008) create a model of shares in the basis of fuzzy and using the important and effective variable by the 97.6% accuracy, as its patten is accepted by the Taiwan electronic companies in Taiwan stock. Starks and Wei (2004) concluded that disclosure of the most of the foreign currency may cause to financial problem in growing opportunities. Bartram (2007) studies the effect of the companies cash and shares price on the changing on foreign currency and concluded that the effect of foreign currency is as the cash. Hammoudeh and Choi (2006) studies in the long time, the effect of Persian golf market shock -which was the result of America oil market- and effect of S and P 500 and treasure documents. Then they concluded that the treasure price has directly influence on market. Jones and Kaul (1996) studies the effect of oil price shocks on equity prices in Japan, America, Canada and Britain concluded that just in oil price stock, America and Canada has effect on real money is completely clear. Nandha and Hammoudeh (2007) study this systematic risk and oil price variable between 15 countries in the Pacific Ocean

and concluded that the effective variable on oil price has more changes in comparison to the market systematic risk of the capital on target country. Randall and Lei (2007) gets in research, price before the big days can be related with those days actions as 1st January. Peter and Zhang (2007) found in their study, the accountant predict share price movements. Söhnke (2007) study the share price and cash of the company and their influence on foreign currency and concluded factories whose share price is affected during the time less and also effect of the risk rate shares price and cash is as some as that one according to the economic factors. The economical variables on TIPIX and found the effect of environmental variables in success and fail. On companies or institutes and share price is more important variable than management in Iran. At this research economic, variables as one of the external variables are confirmed. Henis and Allison (1996) got in their study that companies shares price hasn't effect at shares price changing and shares price changes and shares price of one company and it is depended on the shares price of a company and the other related changes and, can be said they are independent of the shares price of other companies.

Therefore to the mentioned subjects describe the importance and rule of the stock exchange to improve the country economic situation. In this research, internal effective variables on the stock changes price index are studied. Therefore the purpose of the mentioned research is to study and define local models of internal effective variables stock price index at Tehran stock exchange by Fuzzy approach in a conceptual, therefore these research tried to answer this questions, what is the internal effective variables of local model on shares price index at Tehran stock exchange by Fuzzy approach?

## **MATERIALS AND METHODS**

About the research way there are different idea and views (Zohori, 1999). According to this subject and four theoretical views and methods, extending and improving the existing theory, comparing the different theoretical views, study the special phenomenon by using the different theoretical views and finally study the repetitive and well-document (this research was done before) in anew station and conditions (Feldman, 2004), this research is prescriptive is at fourth group.

Statistical population with 500 people at this research includes experts who are aquatinted to stock exchange and the effective variable on stock price and help the researcher to collection the data.

In order to sampling at behavioral science, there are some ways such as simple random sampling, organized random sampling. Taxonomic sampling, racemose sampling is stages sampling (Azar and Momeni, 2000).

To choose statistical sampling at this research we use accessible sampling that the question of distributed letter is 170 and received is 150.

Its area is about stock exchange, especially about price index and its places that makes Tehran stock exchange.

There are four variables according to their rule in answering the question or hypothesis test that includes financial, marketing, structural and management are related to internal arbitrator variable and dependent variable price index.

In order to critically evaluating and validity the used factors (Hult and Ferrel, 1997) in questionnaire, there is some study and testes on factors by the experts and professors, them after adjusting, final questionnaire will be used.

Collection data way is necessary at this research and it is as, the questionnaire is made, it is given at first reference and the statistical society are given necessary explanation, then at second reference they gather the information. After collection them, all of them are encoding, then inter to the FuzzyTech and SPSS software's, so they are arranged and the local model is created.

There are different ways to validating the measurement tools that one of them is asking the question of experts (Bazargan *et al.*, 1998; Sarokhani, 2003). These question is valuable because the parts of the measurable variables are taken from research literature and in other word the related experts are purchase in capital stock. Indeed on questionnaire planning, it is given to the experts and professors on a forward testing, then after receiving their reforming views, final questionnaire planning it will be used for collection information.

In order to determining the validity of the measurement tool, there are different and various ways that one of them is examination of the internal harmony (Conca *et al.*, 2004). Internal harmony of the measurement tool can be measured by Cronbach alpha index (Cronbach, 1951). This is the way which is used in most of the research (Peterson, 1994). However, the minimum and acceptable measurement should be 0.7 but 0.6 or till 0.55 is acceptable too (Van de ven and Ferry, 1979; Nunnally, 1978). In recent research the Cronbach alpha index is 0.86, therefore its durability is confirmed.

**Collection date**

**Fuzzy modeling:** In fuzzy modeling there are different ways about knowing their kinds which can be mentioned as two following:

Fuzzy model parameter, while data are classic

$$y = a + b_1x_1 + b_2x_2 + \dots + b_kx_k$$

Classic model parameter, while data are fuzzy:

- Classic data dependent variable and independent data are classic
- Fuzzy data dependent variable and independent data are classic
- Fuzzy data dependent variable and independent data are fuzzy

**Tests of fuzzy hypothesis:** Fuzzy hypothesis tests can be divided in to four parts:

- Usual hypothesis and observations are fuzzy

$$H_0: \mu = \mu_0$$

$$H_1: \mu \neq \mu_0$$

- Usual hypothesis and observations are usual but used dependencies are fuzzy
- Fuzzy hypothesis, but observations are usual

$$H_0: \tilde{\mu} = \tilde{\mu}_0$$

$$H_1: \tilde{\mu} \neq \tilde{\mu}_0$$

- Fuzzy hypothesis, but observations are fuzzy too

$$H_0: \mu = \mu_0$$

$$H_1: \mu \neq \mu_0$$

**Definitions**

**Fuzzy:** Most of the time gathered information for some reason is not very exactly (crisp) and is along with lack of certainty, that can be modeling as fuzzy model.

- Membership dependency: Is a dependency which describe X variable at [0, 1]:

$$\mu(x): x \rightarrow [0, 1]$$

- **Normal fuzzy No.:**  $\tilde{a}$  is told as normal fuzzy No. which its membership dependency is equally to one in accordance to some points
- **Fuzzy No.:** A fuzzy No.  $\tilde{a}$  is a fuzzy convex subset of the real line satisfying the following conditions:

$\mu_{\tilde{A}}(x)$  is piecewise continuous  
 $\mu_{\tilde{A}}(x)$  is normalized, that is, there exists  $m \in \mathfrak{R}$  with  
 $\mu_{\tilde{A}}(m)=1$ , where,  $m$  is called the mean value of  $\tilde{a}$ .

**Triangular fuzzy No.**  $\tilde{a}$ : A triangular fuzzy No.  $\tilde{a}$  can be defined by a triplet  $(a_1, a_2, a_3)$ . Its conceptual schema and mathematical form are shown by Eq. 1:

$$\mu_{\tilde{a}}(x) = \begin{cases} 0, & x < a_1 \\ \frac{x - a_1}{a_2 - a_1}, & a_1 < x \leq a_2 \\ \frac{a_3 - x}{a_3 - a_2}, & a_2 < x \leq a_3 \\ 0, & a_3 < x \end{cases} \quad (1)$$

A triangular fuzzy No.  $\tilde{a}$  in the universe of discourse  $X$  that conforms to this definition has been shown in Fig. 1.

**Trapezoidal fuzzy No.**  $\tilde{a}$ : A trapezoidal fuzzy No.  $\tilde{a}$  can be defined by quadruplet  $(a_1, a_2, a_3, a_4)$ . Its conceptual schema and mathematical form are shown by Eq. 2:

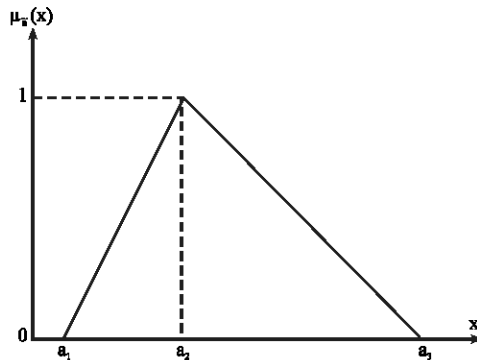


Fig. 1: A triangular fuzzy No.  $\tilde{a}$

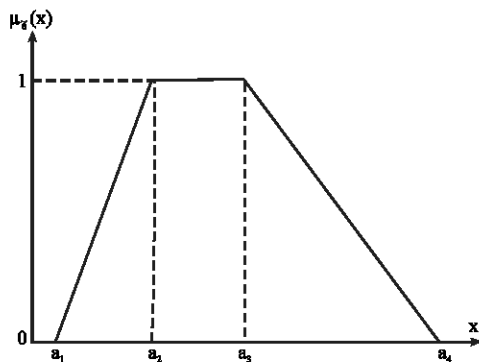


Fig. 2: A trapezoidal fuzzy No.  $\tilde{a}$

$$\mu_{\tilde{a}}(x) = \begin{cases} 0, & x \leq a_1 \\ \frac{x - a_1}{a_2 - a_1}, & a_1 < x \leq a_2 \\ 1, & a_2 < x < a_3 \\ \frac{a_3 - x}{a_3 - a_2}, & a_3 < x \leq a_4 \\ 0, & a_4 > x. \end{cases} \quad (2)$$

A trapezoidal fuzzy No.  $\tilde{a}$  in the universe of discourse  $X$  that conforms to this definition has been shown in Fig. 2.

### RESULTS AND DISCUSSION

**Demographic given data:** Table 1 show 150 statistical simple demographic given data of expert in stock exchange in research as whether was in questioner. Totally we can find male gender that were young and have 1-5 years experience group, so must of them have MA and Ph.D education.

In order to introduce effective variable as effective one on the shares price at Tehran stock exchange, fuzzy hypothesis was used special question what is the local model of effective variable on price index at Tehran stock exchange by fuzzy approach?

At first fuzzy tools at linguistic variable were determined (Fig. 3). Then the variable were described at fuzzy sets that are shown in Fig. 4.

According to the independent linguistic variables, mediator and dependent, the number of the studying hypothesis is equal to  $N^n$  that  $N$  is count division in fuzzy

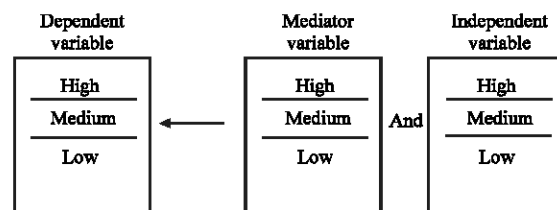


Fig. 3: Research variable fuzzy tools

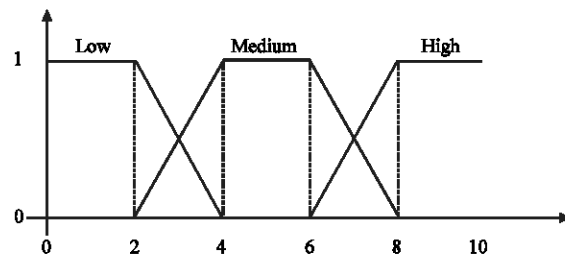


Fig. 4: Presenting high-medium and low fuzzy set at linguistic variables

Table 1: Prescriptive and statistical data of statistical patterns on prescriptive demographics

Quantity	Gender		Age (years)					Experience (year)					Education							
	Female	Male	Total	20-30	30-40	40-50	50-60	Total	1-5	5-10	10-15	15-20	20-25	More than 25	Total	Diploma	Post diploma	Bachelor	MA and Ph.D	Total
	Frequency	30	120	150	90	40.000	10.0000	10.0000	150	60	40.00	20.00	18	8.000	4.000	150	8.0000	4.0000	56.000	82.000
Percent	20	80	100	60	26.668	0.6666	0.6666	100	4	26.66	13.33	12	0.534	0.267	100	0.5333	0.2666	37.334	54.667	100

Table 2: Dependent and mediator and independent linguistic variables information

No. of replier	Independent linguistic variable				Mediator linguistic variable				Dependent linguistic variable					
	Independent variable a	Low	Medium	High	Independent variable b, ...	Score of mediator A	Low	Medium	High	Mediator variable b	Snare	Low	Medium	High
1	7.6	0	0.2	0.8	.	6.9	0	0.55	0.45	.	6.3	0	0.85	0.15
2	6.8	0	0.6	0.4	.	6.9	0	0.55	0.45	.	7.0	0	0.50	0.50
3	6.6	0	0.7	0.3	.	6.7	0	0.65	0.35	.	6.5	0	0.75	0.25
....	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	7.6	0	0.2	0.8	.	6.9	0	0.55	0.45	.	6.3	0	0.85	0.15

Table 3: Hypothesis and their confirmation

No. of repliers	Hypothesis No.			
	1	2	...	N <sup>a</sup>
1	AA...A	AA...B	....	CC...C
2	0.05	0.31	....	0
...	0.09	0.09	....	0
Collection the columns	Σ	Σ	Σ	Σ

Table 4: Fuzzy inference

Repliers No.	Independent linguistic variable	Mediator linguistic variable	Prior result (Min)	Related hypothesis at table	Result (index price stock)	Degree of hypothesis accuracy	Degree of rules accuracy		
1	Low	0	Low	0	0	CC..C	Low	10.76	0
						CC...B	Medium	2.76	0
						....	High	0.00	0
			Medium	0.55	0	...	Low	0.24	0
						...	Medium	3.18	0
						...	High	0.16	0
			High	0.45	0	...	Low	0.00	0
						...	Medium	0.16	0
						AA...A	High	0.04	0
...	...	...	...	...	...	...	...	...	...

tools for linguistic variables and n is No. of the variables. These hypotheses and the No. of the upper affected are presented at Table 2 to emphasize on hypothesis.

It necessary to mention that involved variables are shown with summarizing sign, Therefore, from the left it's toward dependent, mediator and dependent variable.

Also alphabet ABC shows high. Medium (average), low properties. According to the most of the columns collection it can be understand that, its accuracy is more than the other.

In order to be sure of the fuzzy hypothesis testing at Table 3, we use fuzzy inference, which come follow as summary (Table 4).

Table 5: Fuzzy evaluation of price index

Share price index repliers	Low	Medium	High	Total
1	0.014	13.097	7.622	20.738
2	0.025	22.920	2.540	25.480
...	...	...	...	....

By fuzzy concluding, we evaluate price index that for every one of the repliers and the maximum of the accuracy of per rules in fuzzy tools of research variables in relation with independent variable (Table 5).

After fuzzy evaluation and normalize them considering the maximum point of the membership obedient is according to the natural movement to determine the pattern's value.

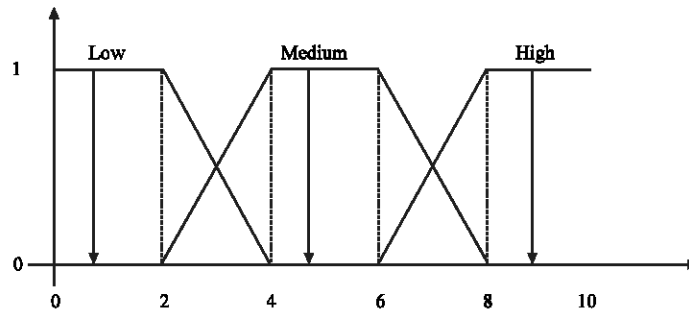


Fig. 5: Pattern's value for linguistics' variables

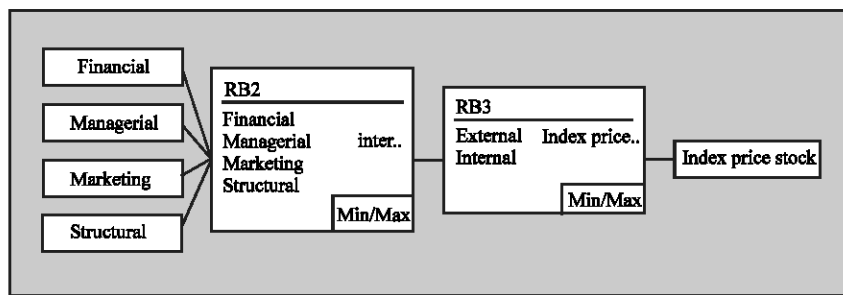


Fig. 6: Conceptual model

Table 6: Absolute worth of the shares price index

Replies	Absolute worth
1	6.467767
2	5.394912
...	...

Table 7: Optimum value of linguistic variable

Index price stock	Internal factors	Managerial	Structural	Marketing	Financial	Optimum
0.2	0.1	0.1	0.1	0.1	0	

By last conclusion the absolute worth's of the research it is shown that research variables have the best condition to describe the local model (Fig. 5) and it is shown in Table 6.

Therefore according to what ever is said research in local model is providing at Fig. 6.

In other word between internal variables, management, marketing and structural variables have highest influence after each other. Also by comparison of the values of internal valuable (Table 7). It is worth able to mention that current research is done by FuzzyTech v.5.61 software.

According to whatever is said, three dimensional charts of research are shown in Fig. 7.

According to this research as it was explain completely, the result of some of these researches is compare with this research. Bordman and Claude (2000) studied different effective variable at index price and

confirmed it is effect on dependent variable, such as size of company, golden shares, kind of industry and different period. Therefore understand that those variables have effect on shares price of stock exchange. While at this research these factors are confirmed in a structure of variable frame work and this model is more comprehensive than (Bordman and Claude, 2000) found management variables are those effected on index price stock. Amirmozafari (2006) in her dissertation concluded, management fame is affected on index price stock. Also Jamshidi (1998) got a linear relation between the out put of per share and share price at Tehran stock exchange. The effect of shares distribution is more on share price according to the long term loan. Also capital in creasing has more effect in comparison to bank borrowing. Last variable on price influence on investors to buy the shares and these finding are in conformity with capital variable of this study.

By the mentioned this study the most important internal variable which has influence on shares price of the accepted company at Tehran stock exchange is in relation to management variables, therefore to make the stock exchange powerful and increasing the company value, it's suggested to the stock holders that be careful about choosing the board of directors in a annually meeting. However, these variables such as: output per



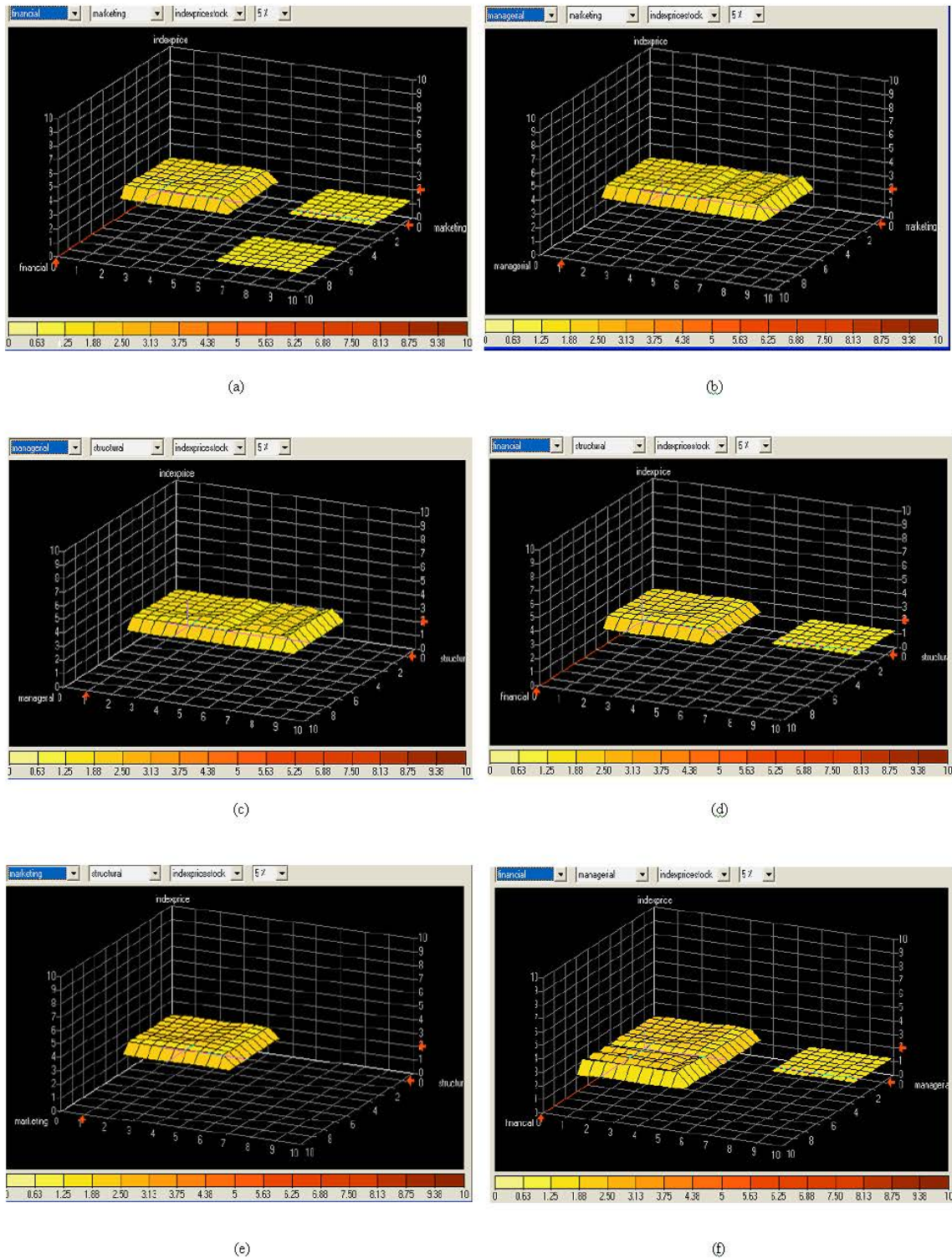


Fig. 7: Three dimensional presentations of variables at first optimum, (a) Financial-marketing, (b) Managerial-marketing, (c) Managerial-structure, (d) Financial-structure, (e) Marketing-structure and (f) Financial-structure index price

share, price in comparison to output, historical movement of shares, measure of assets, output of asset, rate of the capital price, capital changing, financial releasing, golden shares, revealing ... that have effect on shares price index at stock exchange, therefore it is suggested to those companies manager who are accepted in stock to be care about shares price index, till can help the company growing at stock and improving country economy. Because financial freedom is on of the effective variables, it's advised to the stock managers in order to increasing the financial market of country try to be in concordance with other international market.

According to the presented documents in this study passage these subjects are as suggesting to current research in relation to this study:

- Study the local model of effective variable on share price index by wing the management technique
- Identify and ordering the effective variable in stock exchange stagnation
- Clarification of the structural model of effective variable on shares price index at Tehran stock exchange

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