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The Interrelationship between Management Ability and Market Value Added Using Simultaneous Equations

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ABSTRACT

Companies face various unpredictable factors during their economic life, and it is the managers who make the final decisions for the company. Managers must have the necessary ability to identify the specific position and characteristics of the company in order to be able to make the best decision for the company based on his knowledge. Management ability is one of the dimensions of human capital of companies that is classified as intangible assets (Hajib et al., 2016). When managers' decisions have a significant impact on the performance of the organization, the ability of managers will lead to effectiveness in the day-to-day operations of the organization. Therefore, the ability of managers improves the net present value of the organization (Burke and Stanton, 2007). Recent research shows that management ability is one of the determinants of organizational performance. On the other hand, it can be expected that the improvement of economic data (including market value added) will also strengthen the predictability of management ability. Accordingly, the present study investigates the interrelationship (Granger causality) of management ability and market value added. For this purpose, the required information is collected from 105 companies in the period 2015-2019 and the interrelationship between the variables is investigated using the simultaneous panel regression method. The relationship between management ability and market value added is tested using Granger causality. The results indicate a "significant relationship between management ability and market value added" and s "significant relationship between market value added and management ability". The Granger causality test also shows that at the error level of 0.05, the two variables of market value added and management ability are interrelated.

Keywords: Management ability, market value added, simultaneous equation method

1. Introduction

Due to limited financial resources, especially in the field of global trade and the tightening of competition, managers of businesses in the current era are under increasing pressure to reduce operating and prime costs to create the appropriate capital structure to do the activities of the enterprise for increasing the value of the enterprise, timely payment of debts, continuity of activity, and greater presence in domestic and foreign markets. These pressures are usually exerted on corporate executives by various groups such as shareholders, consumers and other stakeholders. To achieve the aforementioned goals, managers' strategies are to provide optimal financial resources with the lowest cost for economic growth and development of activities, increase profits, and maximize shareholder wealth (Ghanizadeh and Barani, 2015). In Demerjian et al. (2013), management ability is defined as the efficiency of managers compared to competitors in converting company resources into revenue. These sources of revenue generation in companies include the cost of inventories, administrative expenses, distribution and sales, fixed assets, operating leases, research and development costs, and intangible assets (Koshafar et al., 2017).

When managers' decisions have a significant impact on the performance of the organization, management ability will lead to effectiveness in the day-to-day operations of the organization. Thus, the ability of managers improves the net present value of the organization (Burke and Stanton, 2007). More capable managers have more knowledge and awareness about customers and macroeconomic conditions. They will also be able to have a better understanding of more complex standards and implement them properly (Hajib et al., 2015). On the other hand, it can be expected that the market value added will also improve the ability of managers. In this regard, this study seeks to answer this question:

- Is there a **Interrelationship** between management ability and market value added?

Considering the dynamics of the studied system of "operation and reflection of results" in the time dimension, the simultaneous panel regression method and Granger causality test are used to investigate the interrelationship between the variables of "management ability and market value added".

2. Theoretical Foundations

Utilizing company assets and efficient investment are among the most important issues in financial management because the efficient use of assets shows the ability of management and is one of the most important options and decisions for managers. The manager must decide how to use the company's assets to reduce the risk of stock prices' falling. Management ability means intelligent use of company time and assets to achieve the best possible result (Mohammadi and Salehi, 2017). Management ability can be defined as the efficiency of managers compared to competitors in converting company resources into revenue. These sources of revenue generation in companies include the cost of inventories, administrative expenses, distribution and sales, fixed assets, operating leases, research and development costs, and intangible assets (Demarjian et al., 2012). Higher management ability can lead to more efficient management of the company's day-to-day operations, especially in critical periods of operations where managerial decisions have a major impact on organizational performance. More capable managers are more likely to invest in projects with a higher positive net present value and also have a greater ability to execute it properly. In addition, in times when the company is in crisis, more capable managers make better decisions regarding the provision of resources (Andreou et al., 2013). Therefore, it is expected that the value of the enterprise will increase as the management ability increases. In fact, an enterprise run by an efficient manager will be more valuable to investors. Poor decisions and poor managerial skills can lead a company to bankruptcy (Lorty and Grace, 2012). The ability of managers is reflected in the results of the company's performance and these results will play a limiting or advantageous role in empowerment in later periods.

3. Research Background

Mehrani et al. (2020) examined the effect of management ability on the timeliness of financial reporting. For this purpose, the data of 127 companies listed on the Tehran Stock Exchange during a period of 10 years from 2008 to 2017 were used. The ability of managers has been measured with the model of Damarjian et al. (2013) and data envelopment analysis (DEA). The results of the hypothesis testing showed that capable managers have a passive effect on the

delay of profit announcement and audit report, and as a result, cause more timely disclosure of financial information. Overall, the results showed that increasing the ability of managers has a positive effect on the timeliness of financial reporting and, by timely dissemination of financial information news, information asymmetry between the company and investors is reduced.

Mashayekhi and Haji Azimi (2015) studied the effect of management ability on the company's performance in the stages of growth, maturity, and decline among listed companies between 2006 and 2014. To this end, the relationship between managerial ability and firm performance was examined in the first hypothesis. The results of the first hypothesis testing showed the positive effect of increasing managerial ability on improving the company's performance in the form of return on investment. In addition, the results of the second hypothesis testing showed that there is a positive and significant relationship between the ability of managers and company performance only in the stages of growth and maturity. However, in the case of active companies, this relationship was not observed in the decline stage.

Sarlak et al. (2017) investigated the effect of managers' ability on investment efficiency. For this purpose, 99 companies were selected from among companies listed on the Tehran Stock Exchange using the screening method and were examined during the period 2008-2014. In order to measure the efficiency of investment, the model used in Verdi (2006) research and to measure the ability of managers, the model of Demarjian (2012) using data envelopment analysis (DEA) has been employed. The research hypothesis was tested using multiple regression using pooled data. The results showed that the quality of financial reporting has a positive effect on investment efficiency. Managers' ability also has a positive effect on investment efficiency.

Tahmasebi Khorneh et al. (2015) investigated the relationship between corporate reputation and financial performance. For this purpose, 64 companies listed on the stock exchange during the period 2011 to 2015 (320 year-company) were selected and the relationship between them was investigated using the method of simultaneous equation system. Findings showed that there is a positive correlation between corporate reputation and financial performance.

Chalaki et al. (2015) experimentally studied the mediating role of financial flexibility in explaining the relationship between management ability and financial distress of 104 companies listed on the Tehran Stock Exchange in the period 2009-2015. The results showed that there is a positive and significant relationship between management ability and financial flexibility. Also, the results indicated a significant negative relationship between management ability and financial flexibility with the company's financial distress. The results of the Sobel test indicated that financial flexibility does not play a mediating role in explaining the relationship between management ability and financial distress. In other words, although financial flexibility is an important and influential element on the financial performance of companies, it cannot mediate the relationship between management ability and financial distress.

Kazemi and Namakavarani (2015) examined the effect of management ability on real earnings management and integrated risk management of companies listed on the Tehran Stock Exchange by studying 75 companies during the period 2008-2018. Findings showed that there is a negative and significant relationship between the management ability and real profit management and there is a positive and significant relationship between the management ability and integrated risk management of companies. The results of the present study can be useful in reducing sudden financial crises in the economy.

Hassani Alghar (2017) investigated the effect of management ability on the financial performance of companies listed on the Tehran Stock Exchange. The statistical population of the study consisted of 118 companies listed on the Tehran Stock Exchange from 2007 to 2014. The measure of management ability is a part of the company's performance that is not affected by the inherent factors of the company. In order to calculate and analyze the information of management ability, the model presented by Demarjian et al. (2012, 2013) has been used. The research hypothesis was tested using multivariate linear regression statistical methods and data envelopment analysis model. The results of testing the research hypothesis showed that the management ability has a significant positive effect on the financial performance of the company; in other words, increasing the ability of managers significantly leads to increasing the efficiency of the company's

operations. According to further studies, the amount of cash flow affects the level of financial performance of the company. The effect of cash flows on the level of financial performance of the company indicates the sensitivity of the company's financial performance to cash flows. Among other control variables, the variables of financial leverage, firm size, and growth opportunities had a significant relationship with company's financial performance.

Momtazian and Kazemnejad (2015) studied the effect of management capabilities on the performance criteria of companies listed on the Tehran Stock Exchange. In this regard, the effect of variables of company size and financial leverage has also been controlled. Therefore, first, the ability of managers has been measured using data envelopment analysis technique. In the following, by calculating each of the four criteria of company performance (economic value added, return on equity, price-to-earnings ratio, and Q-Tobin ratio), the relationship between independent and dependent variables is examined. The statistical sample of the research included 161 companies in the period from 2005 to 2014. The results of testing the research hypotheses showed that in general, there is a direct and significant relationship between managers' capabilities and company's performance criteria. This means that by increasing the ability of managers to better use resources and consequently increase the efficiency of the company, the company's performance is improved, and thus, the wealth of shareholders increases.

Lee et al. (2018) conducted a study entitled "Management Ability and Corporate Investment Policy in US Industrial Companies" and concluded that there is a positive relationship between management ability and investment opportunities, and this relationship is only significant in financial companies or companies that have a strong financial position.

Habib and Hassan (2017) examined the effect of managers' ability on the efficiency of investments and the risk of stock price falling. In this study, management ability was measured using the model of Demarjian et al. (2012) and the results showed that more capable managers invest more than other managers. This indicates that the ability of the manager has a significant relationship with the efficiency of investment in companies. The results also indicated a relationship between the management ability and the risk of stock price falling.

Huang and Sun (2017) investigated the effect of management ability on real profit management. The results of their research showed that the more capable managers are, the less they manage profit, and also the more capable managers reduce the negative impact of profit management on the future performance of the company.

Panayiotis and Daphna (2016) examined the effect of management ability on the company's investment in times of crisis. The results showed that management ability can be effective in predicting next year's financial crisis.

Chen et al. (2015) studied whether management ability leads to success facilitation in corporate innovation. They concluded that the ability of managers is one of the main components of success in innovation decisions and has a positive relationship with the market value of companies.

Management ability can be described as the intelligent use of a company's assets in a sequence of cycles to achieve the best possible result with the goal of creating value.

4. Research Objectives and Hypothesis

The main purpose of this study is to investigate the interrelationship between the management ability and market value added using the method of simultaneous equations. It seeks to answer the question of whether the management ability is interrelated with market value added in the studied companies that have driven the ability of management to use company resources in line with improving economic data (market value added). Also, using investment opportunities with higher returns, providing resources and, in turn, improving economic data, will enable the company and increase the company's competitiveness in the market.

The system of simultaneous equations is more reliable and accurate than estimating single equations.

Research hypothesis

Considering the theoretical foundations and research background, the purpose of this research is to investigate the interrelationship between management ability and market value added and the research hypothesis is presented as follows:

- There is a relationship between management ability and market value added using simultaneous equations.

Research Population

The statistical population of the study includes all manufacturing companies listed in the Tehran Stock Exchange from 2015 to 2019 (five years). The sample of the study was selected through systematic elimination method based on the following three criteria:

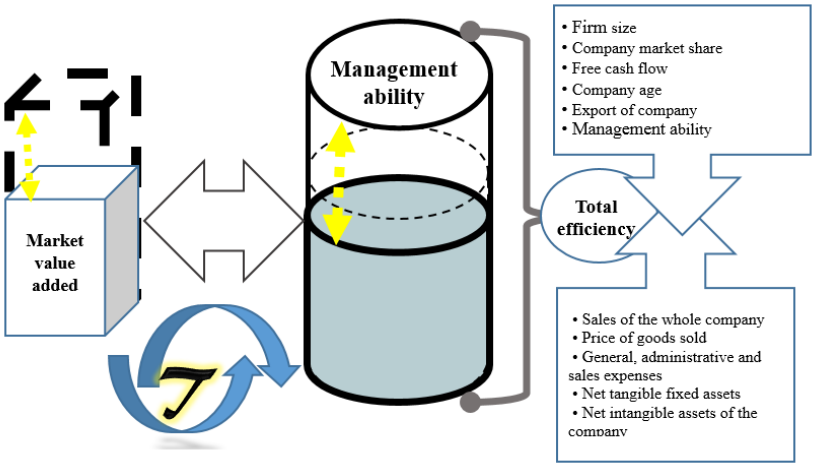
1) Complete and detailed information of the annual financial statements of each company should be available in the table of Tehran Stock Exchange in the 5-year period under review (2015-2019).
2) The companies under review will continue to be members of the stock exchange until the end of 2019.
3) Companies whose fiscal year does not end in March 20 have been removed from the statistical population.

Applying the above conditions and using the systematic elimination method, 105 companies have been selected as the statistical sample of the study.

Table 1: Statistical sample

Description	No. of companies
Companies that are members of the stock exchange until the end of 2019.	536
Companies whose fiscal year does not end on March 20 and have changed their fiscal year.	328
Companies that have not had ceased operations during the financial year.	239
Companies that are part of credit, insurance, investment, banking and leasing companies.	197
Companies whose financial statements and information are not available.	105
Total number of sample companies	105

5. Conceptual Research Model



6. Research Method

The present research method is applied in terms of its results because the results can be applied in practice. It is a descriptive-correlational study in terms of its methodology. Because on the one hand, it examines the current situation of the study population without interference and on the other hand, in examining the relationship between variables, simultaneous panel regression and Granger causality test are used. This

study is also a post-hoc research in terms of its nature. R software has been used to test the hypotheses.

The following model is used to examine the interrelationship between the two variables of management ability and market value added using simultaneous equations:

- Sales of the whole company
- Price of goods sold
- General, administrative and sales expenses
- Net tangible fixed assets
- Net intangible assets of the company

Research Hypothesis Model

$$\text{Management ability}_{it} = a_0 + a_1\,\text{MVA}_{it} + a_2\,\text{SIZE}_{it} + a_3 MBV_{it} + a_4\,\text{Lev}_{it} + a_5\,GROW_{it} + \varepsilon_{it}$$

Firm Size (SIZE): is the natural logarithm of the total sales of the company;
Financial Leverage (LEV): is obtained by dividing the total debt of the company by the total assets of the company.
Ratio of market to book value of stocks (MBV): which is calculated by dividing the average market value of the company's equity to its average book value at the end of the year.
Company growth (GROW): is calculated by the changes in sales of this year compared to sales of the previous year.
Market value added: Capital used in the company - Company market value = MVA

Research Variables' Measurement

In this study, the model presented by Demarjian et al. (2012) was used to measure management ability. Our first measure of management ability is a set of managerial abilities through which company performance is enhanced. In order to measure the performance of the company, Demarjian et al. (2012) used the data envelopment analysis (DEA) model. DEA is a kind of statistical model used to measure the performance of a system using a series of outputs and inputs. In evaluating company performance by DEAs, we assign a performance score of between zero and 1 to each company each year. The maximum efficiency is equal to 1, and the lower the value, the lower the efficiency of the company. In this study, sales revenue is considered as output and 4 other variables, namely the price of the goods sold; general, administrative and sales expenses; net tangible fixed assets; and intangible assets are considered as input. Total EFFICIENCY is obtained from Equation (1):

$$\text{TotalEFFICIENCY}\tau = \frac{\text{Saeles}}{\alpha 1\text{GOGS}\tau+\alpha 2\text{SGA\&A}\tau+\alpha 3\text{NETPPE}\tau+\alpha 4\text{INTAN}\tau} \quad (1)$$

Where,
SALES: is the whole sales of company i in year t.
GOGS: is price of goods sold by company i in year t.
SG&A: is general, administrative and sales expenses of company i in year t.
NETPPE: is net presumptive tangible assets of company i in year t.
INTAN: is net intangible assets of company i in year t.
Demerjian et al. (2012) have provided a model for achieving management ability and controlling the inherent characteristics of the company. Company efficiency is divided into two separate parts, namely performance based on the inherent characteristics of the company and management ability. They have used Equation (2) in which the firm size, the market share of the company, the cash flow of the company, the age of the company listed on the stock exchange, and foreign sales are considered as inherent characteristics of the company. Each of these five variables, which are inherent characteristics of the company, can help management to make better decisions or act in the opposite direction and limit management ability.

$$TOTALEFFICIENCY_{it} = \alpha. + \alpha_1\text{SIZE}_{it} + \alpha_2\text{MARKET SHARE}_{it} + \alpha_3\text{FREECASHFLOW}_{it} + \alpha_4\text{AGE}_{it} + \alpha_5\text{FOREIN CURRENCY}_{it} + \alpha_6\text{YEARINDICATOR}_{it} + \varepsilon_{it} \quad (2)$$

Where,
Company Size (SIZE): is the natural logarithm of the total sales of the company.
Company market share (MARKET SHARE): is obtained from the ratio of company sales to sales of the entire industry.
FREE CASH FLOW: If the company has a positive free cash flow, it is assigned number one, otherwise it

is zero. Free cash flow is calculated as follows (Ali Nejad and Tarfi, 2017).

Free cash flow = operating profit + depreciation - tax paid - interest paid - dividend paid

Company Age (AGE): is the natural logarithm of the number of years a company has been in operation.

Company Export (FOREIN CURRENCY): If the company has exports, it is assigned number one, otherwise, it is assigned zero.

Epsilon (ε_{it}): indicates the extent of management ability. (Ali Nejad and Tarfi, 2017).

7. Data Analysis

The necessary information has been collected using the field method and through the databanks of the Tehran Stock Exchange and Rahavard Novin software. Data analysis and hypothesis testing were performed within the framework of the system of simultaneous equations in the R software environment.

Simultaneous Equations Model

In many cases, a one-way causal relationship is not appropriate to explain economic relations. In these cases, y depends not only on the variables x, but some xs are in turn determined by y. In short, in these cases, there is a two-way or simultaneous relationship between y and (some) x variables; as a result, distinguishing the variables as explanatory and dependent variables is not valid. In this way, by classifying a set of variables that are simultaneously determined by another set of variables, models of simultaneous equations will be obtained. In such equations, the number of equations will be more than one. In other words, for each endogenous variable or (dependent), there will be an equation. Therefore, unlike the single equation model, in simultaneous equation models, it is not possible to estimate the parameters of a single equation without considering the information obtained from other system equations. The concept of causality is a subjective phenomenon that has not an exact objective equivalent in this world. With this description, in all scientific discussions, the discussion is mainly about causal relationships between variables. One of the methods designed to objectively examine causal relationships is the Granger causality test. Since in the real world, cause generally takes precedence over effect, the idea comes to mind that if a variable changes over a period of time and then another variable changes, and this relationship is statistically significant, a causal relationship exists. Thus, the first variable has been the cause of the second variable. In fact, such a situation indicates the existence of a relationship and temporal precedence between the cause variable and the affected variable. The Granger causality test is also based on this. In fact, the Granger causality test examines whether the existence of a relationship and temporal precedence is statistically verifiable. It is obvious that whenever the variable is the cause of another variable, with a specific change in the variable of the cause, the effect variable can be affected by one or more periods of time delay, but the opposite is not necessarily the case.

The cause-and-effect diagram, while describing the causal relationships between two or more variables, also identifies the direction in which those variables are to be affected. In addition to describing, it emphasizes the impact on the structure of feedback in a system. The logic of this model is systemic thinking and closed-loop system, which is based on the discussion of formulating dynamic hypotheses and mapping in dynamic systems. In this step, according to the pattern boundary, a cause-and-effect model is prepared. Granger (1969) presented the following model and expressed a method for examining the direction of causality between two variables:

$$y_t = \sum_{i=1}^{n} \alpha_i y_{t-i} + \sum_{i=1}^{n} \beta_i x_{t-i} \quad (3)$$

$$x_t = \sum_{i=1}^{n} c_i x_{t-i} + \sum_{i=1}^{n} d_i y_{t-i} \quad (4)$$

Now, after estimating the above model, if the coefficients β_i are statistically significant, it is said that the variable x_t is the Granger cause of variable y_t, and if the coefficients d_i are also statistically significant, the variable y_t is the Granger cause of variable x_t. If only one of the coefficients is significant, the causal relationship between the two variables is one-way, and if both are significant, the causal relationship is two-way, which means that there is a feedback relationship between the two variables. Granger causality test shows whether there is a two-way causality relationship between two variables or not (Aflatooni, 2018).

8. Research Findings

After calculating the variable of management ability based on the model presented by Demarjian et al. (2012), diagnostic tests were performed to check the

assumptions and type of model. First, the staticity of research variables was examined using Maddala and Wu (1999) test. The results showed that for all variables, the P-value of the staticity test was less than 0.05. Therefore, the staticity of all variables can be accepted. Next, the first diagnostic test is the F-Limer test. If P-value is less than 0.05, panel regression method and otherwise OLS regression is selected. For this model, the P-value of the F-Limer test indicates that at the 5% error level between the OLS method and the panel method, the panel method should be used. Once the panel model is selected, the Hausman test is used to correctly identify the model used and whether the fixed effects model is the subject of the estimation method or the random effects model. If the P-value of the test is less than 0.05, the method with fixed effects and otherwise the method with random effects will be selected. For the research model, the P-value of the Hausman test indicates that the model estimation by the random effects method is better. To test whether the errors of the model used are serially autocorrelated, the Breusch-Godfrey test was used. If the P-value is less than 0.05, it can be said that the studied data have serial autocorrelation. The P-value of Bruch-Godfrey test for the research model indicates no serial autocorrelation in this model. The Breusch-Pagan test is used to test whether the error of the model used has heteroscedasticity. If the P-value is less than 0.05, it can be said that the studied data have heteroscedasticity. The P-value of Breusch-Godfrey test for the research model shows homoscedasticity.

Maddala and Wu test (1999) was used to evaluate the staticity of variables, the results of which are presented in Table (2).

Table 2: Unit root test of variables

	SIZE	MARKET SHARE	FREE CASH FLOW	AGE	FOREIGN CURRENCY
P-value test	$< 2 \times 10^{-16}$	$< 2 \times 10^{-16}$	$< 2 \times 10^{-16}$	$< 2 \times 10^{-16}$	$< 2 \times 10^{-16}$

As can be seen, the P-value of all variables was less than 0.05. Therefore, the staticity of all variables can be accepted.

After establishing the defaults of the research hypothesis models, the panel regression method with random effects can be used to estimate the research hypothesis models. The results of panel regression are shown in the following tables.

- There is a correlation between the management ability and market value added using simultaneous equations.

To test this research hypothesis, first the following two regression models will be fitted to investigate the effect of these two variables on each other:
The first regression model:

$$\text{Management ability}_{it} = a_0 + a_1\,\text{MVA}_{it} + a_2\,\text{SIZE}_{it} + a_3 MBV_{it} + a_4\,\text{Lev}_{it} + a_5\,GROW_{it} + \varepsilon_{it}$$

The second regression model:

$$\text{MVA}_{it} = a_0 + a_1\,\text{Management ability}_{it\ it} + a_2\,\text{SIZE}_{it} + a_3 MBV_{it} + a_4\,\text{Lev}_{it} + a_5\,GROW_{it} + \varepsilon_{it}$$

As mentioned before, before performing the regression model, it is required to perform tests to select the best regression model. The tests performed are as follows:
The first test is the F-Limer test. If P-value is less than 0.05, panel regression method and otherwise OLS regression is selected.

Table 3: F-Limer test results

Model	Null hypothesis (H_0)	F-statistics	P-value	Test results
First	Superiority of OLS	1.381	0.015	H_0 is rejected
Second	Superiority of OLS	3.06	0.000	H_0 is rejected (Panel regression is better)

The F-Limer test indicates that at the 5% error level between the OLS method and the panel method, the panel method should be used.

After the panel model is selected, we use the Hausman test to correctly identify the model used and whether the fixed effects model is the subject of the

estimation method or the random effects model. If the P-value of the test is less than 0.05, the method with fixed effects and otherwise the method with random effects will be selected. The results of this test are as follows:

Table 4: Hausman test results

Model	Null hypothesis (H_0)	Chi-square	P-value	Test results
First	Use of random effect model	10.38	0.065	H_0 is not rejected (Random effect method is better)
Second	Use of random effect model	2.67	0.75	H_0 is not rejected (Random effect method is better)

As can be seen, the random effects method is recommended for the first and second models.

To test whether the errors of the model used are serially autocorrelated, we use the Breusch-Godfrey test. If the P-value is less than 0.05, it can be said that the studied data have serial autocorrelation. The test results are as follows.

Table 5: Breusch-Godfrey test results

Model	Null hypothesis (H_0)	Chi-square	P-value	Test results
First	There is no serial autocorrelation	3.73	0.59	H_0 is not rejected (There is no serial autocorrelation)
Second	There is no serial autocorrelation	4.66	0.46	H_0 is not rejected (There is no serial autocorrelation)

As can be seen, the P-value is greater than 5%, so the lack of autocorrelation of the model error is accepted.

To test whether the model error used has heteroscedasticity, we use the Breusch-Pagan test. If the P-value is less than 0.05, it can be said that the studied data have heteroscedasticity. The test results are as follows:

Table 6: Breusch-Pagan test results

Model	Null hypothesis (H_0)	Chi-square	P-value	Test results
First	There is error homoscedasticity	3.838	0.57	H_0 is not rejected (There is error homoscedasticity)
Second	There is error homoscedasticity	1.34	0.93	H_0 is not rejected (There is error homoscedasticity)

As can be seen, the P-value is greater than 5%, so the model error homoscedasticity is accepted.

In this regard, by summarizing the regression assumptions, it has been concluded that we should use panel regression with random effects. After performing this regression, the results are as follows:

Table 7: Test results

First model	$\text{Management ability}_{it} = a_0 + a_1 MVA_{it} + a_2 \text{SIZE}_{it} + a_3 MBV_{it} + a_4 \text{Lev}_{it} + a_5 GROW_{it} + \varepsilon_{it}$					
Coefficients	**VIF**	**Variable coefficients**	**Error SD**	**t-statistics**	**P-value**	**Result**
Intercept	-	0.0061	0.0457	0.132	0.894	Not significant in the model

MVA	1.005	1.178×10^{-2}	2.943×10^{-8}	4.00	0.000	Significant in the model
SIZE	1.003	2.43×10^{-4}	3.04×10^{-5}	7.99	0.000	Significant in the model
MBV	1.002	3.47×10^{-4}	3.526×10^{-5}	9.83	0.000	Significant in the model
Lev	1.003	0.118	0.0062	18.92	0.000	Significant in the model
GROW	1.002	0.0689	0.0397	1.762	0.0786	Not significant in the model
Coefficient of determination				0.385		
Model significance test				F-statistics	140.01	
				P-value	0.000	
Second model	$MVA_{it} = a_0 + a_1$ Management ability$_{it} + a_2$ SIZE$_{it} + a_3 MBV_{it} + a_4$ Lev$_{it} + a_5\ GROW_{it} + \varepsilon_{it}$					
Coefficients	VIF	Variable coefficients	Error SD	t-statistics	P-value	Result
Intercept	-	30672.21	6686.29	4.587	0.000	Significant in the model
Management ability	1.013	2619.38	654.37	4.00	0.000	Significant in the model
SIZE	1.003	249.59	453.85	0.5499	0.5826	Not significant in the model
MBV	1.000	546.35	52.52	10.40	0.000	Significant in the model
Lev	1.008	9112.35	9293.06	0.981	0.327	Not significant in the model
GROW	1.008	2625.93	5930.06	0.443	0.658	Not significant in the model
Coefficient of determination				0.219		
Model significance test				F-statistics	35.11	
				P-value	0.000	

As can be seen in Table (7), the maximum VIF values in both models were less than 5. Therefore, the

existence of all variables in the model will not distort it. The P-value (0.000) of the significance test of the models also confirms the suitability of these models.
The results indicate that:

The first regression model

According to the results, t-statistic (4.00) shows that the independent variable MVA in this model is statistically significant at 95% confidence level because firstly, the absolute magnitude values of this statistic are more than 1.96 and secondly, P-value (0.000) is less than 5%.

According to the results, t-statistic (7.99) shows that the independent variable SIZE in this model is statistically significant at 95% confidence level because firstly, the absolute magnitude values of this statistic are more than 1.96 and secondly, P-value (0.000) is less than 5%.

Also, t-statistic (9.83) shows that the independent variable MBV in this model is statistically significant at 95% confidence level because firstly, the absolute value of this statistic is more than 1.96 and secondly, P-value (0.000) is also less than 5%.

Moreover, t-statistic (18.92) shows that the independent variable Lev in this model is statistically significant at 95% confidence level because firstly, the absolute value of this statistic is more than 1.96 and secondly, P-value (0.000) is less than 5%.

According to the results, t-statistic (1.762) shows that the independent variable GROW is not statistically significant in this model at 95% confidence level because firstly, the absolute magnitude values of this statistic are less than 1.96 and secondly, P-value (0.155) is also more than 5%.

The second regression model

According to the results, t-statistic (4.00) shows that the independent variable Management ability in this model is statistically significant at 95% confidence level because firstly, the absolute value of this statistic is more than 1.96 and secondly, P-value (0.000) is also less than 5%.

As can be seen, t-statistic (0.5499) shows that the independent variable SIZE in this model is statistically significant at 95% confidence level because firstly, the absolute value of this statistic is more than 1.96 and secondly, P-value (0.5826) is less than 5%.

Also, t-statistic (10.40) shows that the independent variable MBV in this model is statistically significant at 95% confidence level because firstly, the absolute value of this statistic is more than 1.96 and secondly, P-value (0.000) is less than 5%.

Moreover, t-statistic (0.981) shows that the independent variable Lev in this model is not statistically significant at 95% confidence level because firstly, the absolute magnitude values of this statistic are less than 1.96 and secondly, P-value (0.327) is more than 5%.

Finally, t-statistic (0.443) shows that the independent variable GROW in this model is not statistically significant at 95% confidence level because firstly, the absolute magnitude of this statistic is less than 1.96 and secondly, P-value (0.658) is more than 5%.

Then, to test the research hypothesis, Granger test based on lag (1 and 1) has been used, the results of which are described in Table (8).

Table 8: Results of Bilateral Granger Causality Test

Null hypothesis (H_0)	Chi-square	P-value
Management ability is not the Granger cause of market value added.	205.76	0.000
Market value added is not the Granger cause of management ability.	1158.2	0.000

The results of Granger causality test indicate that management ability is Granger cause of the adjusted market value added because the P-value (0.000) of the test is less than 5%. Also, the market value added is Granger cause of management ability because the P-value (0.000) of the test is less than 5%. Hence it can be said:
"There is an interrelationship between the management ability and market value added using simultaneous equations."

9. Discussion and Conclusion

In this study, the interrelationship between the variable of management ability and market value added was investigated. First, the effect of each variable on each other was investigated using simultaneous panel regression. Then, by performing Granger causality test, the two-way relationship between these two variables was confirmed. The results showed that there is a positive and significant two-way relationship between management ability and market value added.

In justifying this relationship, it can be stated that companies with high management ability are more popular and thus, have a general acceptance, whereby investors, creditors of their capital and customers trusting these companies buy their products as a priority. Therefore, profitability is increased by increasing the sales of the business unit and market value added is also increased by reducing the cost of capital. On the other hand, the high performance of business units leads to the creation of a positive image and mentality of the company among stakeholders and thus, leads to an increase in management ability.

The present study was conducted according to the nature of measuring causal relationships between performance evaluation variables. According to the results of quantitative analysis, the two-way Granger causality relationship between management ability and market value added variables was confirmed. Hence, integrating market added value data to the model strengthened the model predictability. In addition, the outcome-hybrid performance means that economic data, including market value added, at the beginning of the period plays both a limiting and an advantageous role in management ability. In a way, it can be stated that the management ability of each year affects the management ability of the next year through market value added.

Considering the confirmation of a significant two-way relationship between management ability and market value added, investors and creditors of companies listed on the Tehran Stock Exchange are suggested to consider the relationship between management ability and market value added (capability of companies) in consecutive periods in the analysis as well as in planning their decisions. By recognizing endogenous and exogenous variables and dynamic system components, the ability to model system behavior will increase.

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