

The Study and Test Dividend Policy Based on Models Ohlson: Case Iran Market

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Abstract

This study investigates the effects of dividend policy on market value. empirically the research data is collected from 65 firms in the Tehran Security Exchange (TSE) during 2005-2014. multiple regressions technique is used for examining the stated hypotheses. It is used for, three Ohlson equity valuation models. The first model is based on permanent earning and the second model is based on expected future earnings and, finally, the third model is based on current earnings. The relationship between earnings and dividends has content information for evaluation of the companies. In order to examine the hypotheses, data is collected from the annual reports of the companies using official bulletins of the Tehran stock exchange, mainly, through Novin software, Tadbir Pardaz software, and stock sites such as www.rdis.ir & www.irbourse.com. The results indicate that based on the models, debt, permanent income and, the net operating cash flows, debt and investment, , investments and debt are associated with stock prices, significantly and positively and all samples are selected. It also confirms that the results of the comparison of three models, anatomical features and the ability of the models to predict the market value are more important than the other two models. This research provided a good chance to examine the effects of dividend policy on company's market value. Meanwhile, it took into consideration whether other control mechanisms such as firm's size have any effects on this relationship.

Keywords: dividend policy, the company's market value, equity valuation models Ohlson

1. INTRODUCTION

Most researches on securities valuation focus on net income and book value (composition of them as the main factors determining the value (price), less dividend policy and its relation to the stock market.

Ohlson (1995) model of equity valuation was expanded based on the theoretical framework of the dividend Modigliani and Miller (1961). He claimed that when dividends are paid, book value of equity decreases. However, no impact is reported on current earnings. Therefore, the current market value of the company's dividend policy is not affected. Consequently, recently, equity valuation models based on Ohlson(1995) ordered to investigate the broader issues related to assess interest rate, risk and the relationship between earnings and stock price. In this study, three models of equity valuation have been stated based on Ohlson (1995). The first-ordered model, based on permanent earning, the second model is based on earnings from present discounted value in expected future . Finally, the third model is based on current earning. The permanent earning hypothesis uses dividend adjustments. The permanent earning hypothesis components form the present discounted value of expected future earnings, are represented by the permanent earning, without considering the volatile components of earnings and dividends that are used to adjust quickly. Gordon dividend growth model is based on accounting data. He (1962) believed, stock dividends affect recommendations to increase the value of observational management that companies must have for a high rate of dividend payment. And the relationship between stock prices and earnings components of the permanent, components of the discounted value of expected future earning and the current earnings components which are now being investigated, in the present study, to determine the predictability and Anatomical Model that are empirically examined. Features of this model are as follows:

Model 1:It considers dividend as a fraction of the permanent component of earnings.

Model 2: It considers dividend as a fraction of the present discounted value of expected future earnings.

Model 3:It considers dividend as a proportion of the current earnings.

2. LITERATURE REVIEW

Gordon (1959) argued that dividend policy affects the company's cost of capital and this supports the view that the higher rates of paid dividends, cover more cost of capital

Modigliani and Miller(1961)Texted analysis of capital to draw the policy to pay dividends. They argued that as long as the company's cash flow distribution is stable and there is no tax effect, choosing a policy of paying dividends on the stock market value has no effect. In their analysis, there was the increased profits from the sale of shares of new stock supply.(Ohlson ,1995), There was also the residual income valuation model based on earnings, book value of assets and development rights to owners of capital. Ohlson's model under the framework of the theory is developed in relation to dividends. He claimed dividends are paid, current book value of equity will be reduced, but it does not affect current earnings. The claims concerning that his theory of dividends Modigliani and Miller(1961) is consistent. Barclay,(1995) after numerous studies, three factors will be discussed as determinants of corporate dividend policy; (1) the amount of investment opportunities, (2) the effects of a

updates and changes in cash dividends (3) firm size. In their model, the cash dividend yield on the dividend policy is intended as a substitute variable. Bar&Callen (1996)' dynamic data, the model Ohlson discovered and found that earnings, book value of assets, equity and dividend, in a period of time, the dynamic information in connection with the evaluation of the equity are important.

Lee& Frankel (1998) found that, if the estimated market value of companies is Ohlson evaluation model and the investment decisions are taken, a higher efficiency can be occupied for periods of one, two or three more years. Lo& Lys(2000)studied Ohlson literary model, and showed that the evaluation model developed by Ohlson on the accounting items have an impact on financial information and market research.

Other research and theories was conducted about the determinants of dividend policy by(Beiner, 2001) to test this model that had presented in previous research. His research makes clear that the dividend yield on Swiss companies are associated with a dividend yield profits each year. This is consistent with the theory of smoothing. Meanwhile, investment opportunities and firm size, the Swiss company has an inverse relationship with income distribution.

Yun-sheng & et al (2005) were investigated three model of equity valuation models Ohlson, the relationship between earnings, dividends and dividend information content in the evaluation of the company. Experimental results of their research developed for the three models shows that, the Model 2 anatomical features and the ability are better to predict stock price. Also, all three models, book value of equity, debt and investments price of stock are related to each other for the total sample.

Balachandrak & &et al (2007) Reducing the impact of dividends on the wealth of shareholders and the stock price reaction to dividend cuts and the end of the period looked Australian companies. They found that the market reaction to dividend cuts is more negative during periods of declining profits stock at the end of the year. They also showed the amount of dividends reduces the risk of company's profitability and changes in corporate profitability.

(Fairchild ,2008) A stock dividend signals the complex relationship between a stock dividend, motivated managers and it shows the value of the company.The research results show that the stock dividend a signal of current earning provides, and affects the ability to participate in a new investment project.. He also received signals into higher dividends on investment because of the condition and treat hair, and higher quality signal is lower than the dividend shares.

Harris and et al (2008) divided the discounted dividend model (DDM) ¹or the Gordon growth model began. They also estimated the intrinsic value of equity model that is used to estimate the return on equity where reviewed. They showed the DDM model between P/E multiple in a market with market growth rate relationship exists.

Priestley & et al (2009), smoothing it into dividends and it were investigated predictability. The results showed that, if the stock splits is in a smoothing company there is predictability in a sample of the limits. Also it is possible to predict, dividend growth stocks in companies that profit sharing is a smooth coat in them to get rid of that less dividend smoothing.

Booth & et al (2009), examined how the imperative of market power on dividend policy affects the market measured by means of three criteria: 1. Fayndl and Hrchymn the index 2. The basic firms of imported jackets. 3.Learner indices were used. Results showed that the market positively on the ability to pay dividends and dividend decisions also affect the amount of dividends. They found the impact on market structure decisions, where dividend stocks, is a commercial risk.

Basel Al-Najjar & et al (2010), examined the relationship between time deposits and corporate dividend policy in a broad sample of 400 companies for the period 1991 -2008 . Their investigation shows that deposit, the dividend, leverage, growth; size, risk, and profit potential are influenced. It also showed that when both variables are divided into bonds and dividends they are simultaneously monitored by the impact of any criteria.

(Mazna Ramli , 2010) examined the impact of policies on distribution of profits and ownership structure, in companies in Malaysia in a time period 2002 - 2006. His research shows that companies that benefit more from the shareholders have split the shares of large and has increased; and the importance of the dividend to shareholders will be higher in the company of great importance in the distribution of profits.

Dimitar Rafailo & et al (2011), examined the impact of the company's characterizes on dividend decisions. The results showed that dividend policy depends on the life cycle of a conflict of interest between minority and majority shareholders.

3. RESEARCH HYPOTHESES

in fact This hypothesis, is the reconnaissance of those financial variables that affect the company's market value. Corporate dividend policy has been used to reflect the same variables. These variables are permanent components

¹ . Dividend discount model

of earnings (book value of equity, debt, investments, financial assets and permanent earning), the present discounted value of the components expected future earnings (book value of equity, debt and investment, and net operating cash flow) and components current earnings (book value of equity, investment and financial assets and liabilities).

Hypotheses of this study are as follows:

3.1. The first of hypotheses: There is a significant relationship between the company's market value and companies which considers dividend as a fraction of the permanent component of earning.

3.2. The second of hypotheses: There is a significant relationship between the company's market value and companies which considers dividend as a fraction of the present discounted value of expected future earnings.

The third of hypotheses: There is a significant relationship between the company's market value and companies which consider dividend as the proportion of the current earnings.

4. VARIABLES DEFINITIONS

4.1. Dependent variable:

Market value of Stock: Last value traded (market) is the common stock at the end of the fiscal period. The value of statistics and information is available on scholarships. Such as www.rdis.ir &www.irbourse.com.

4.2. Independent variables:

The independent variables investigated financial assets, permanent earnings, book value of equity, investments, debt and net operating cash flow of the balance sheet data, income statement and operating cash flows of the companies listed in Tehran Stock Exchange during 2003-2010. Data and information are collected from the annual reports of the official bulletins of the Tehran stock exchange, market information, stock organization library, Novin software, Tadbir Pardaz software, and stock sites such as www.rdis.ir & www.irbourse.com.

Independent variables of this study are calculated:

Financial assets: a simple measure of net of financial obligations (FA_t)¹ is the first operational assets, the operating assets (OA_t)², subtracting the book value of equity, cash and short-term securities, plus short-term and long-term debt and minority rights are calculated, Morton & schafere, (2000). from the book value of equity, the entire net operating assets (OA_t) and net of financial obligations (FA_t) is the net result of financial obligations (FA_t), the difference can be achieved from between the net book value of operating assets of the owners of capital Feltham & Ohlson(1995).

FA_t is calculated and defined as follows:

$$NOA = OA - OL = Cash - OL \quad (1)$$

OA =Operating assets

OL =Operating liabilities

A = Total assets

Cash= Short-term investments + cash

$$FA_t = NOA - Y_i \quad (2)$$

FA_t = financial assets

Y_i = Book value of equity

Permanent income: Income before items by discontinued operations minus the unexpected and the annual adjustments of the tax Morton & Hong (1999). This value can be easily calculated based on data and information exchange.

Book value of equity: shares of the Company's offices, is based on historical cost at the end of the fiscal period. The balance sheet value of companies is available listed on the Stock Exchange Audited Financial Statements.

Investment: Is additional investment is include long- term and short-term investment.

Liabilities: Total liabilities include current liabilities, long-term liabilities, other liabilities and a reverse is calculated.

Operating net cash flows: Total received minus total cash payments of cash from operations or net assets during a period to be determined Feltham & Ohlson (1995). If the value of corporate cash flows, presented in the Audited Financial Statements is available in stock.

These Variables are summarized in the table (1).

¹. financial assets

². Operating assets

(Table 1)
 Description of the variables

| Names of the Variables | Proxies | Calculations |
|------------------------|-------------------------|---|
| P_i | market value of Stock | Last value traded (market) is the common stock at the end of the fiscal period. |
| FA_t | financial assets | Net of operating assets- Book value of equity |
| $X_{i,t}^P$ | permanent earning | Income before items by discontinued operations minus the unexpected and the annual adjustments of the tax |
| $Y_{i,t}$ | Book value of equity | shares of the Company's offices at the end of the fiscal period, is based on historical |
| $L_{i,t}$ | Investment | Additional Investment |
| $B_{i,t}$ | Liabilities | Total liabilities(current liabilities+long-term liabilities+other liabilities+reveres) |
| $C_{i,t}$ | Operating net cash flow | Total received - total cash payments of cash |

5. METHODS OF DATA ANALYSIS

In this study, the multiple regressions are used for data analysis. Initial data was inserted in Excel spreadsheet and SPSS software was applied to analyze the data statistically. Also Rahavard Novin software, Tadbir Pardaz software, stock organization library and stock sites such as www.rdis.ir & www.irbourse.com were used.

6. RESEARCH METHOD AND REGRESSION MODEL

Considering that the aim of this study was to examine the relationship between stock prices and earning's components of the permanent, components of the discounted value of expected future earning and the current earning's components that as a share dividend policy is to replace the variables, and attention to three groups of variables and assumptions about the research mentioned in the same way it was prior to the model, and the overall study group for each of the following research was decisive. First of all variables in the model study in a multiple regression model tested general form it is as: follows

$$P_i = C_0 + C_1 FA_{i,t} + C_2 X_{i,t} + C_3 Y_{i,t} + C_4 B_{i,t} + C_5 L_{i,t} + \varepsilon_{i,t} \quad (3)$$

In the Model 2:

$$pi = h_0 + h_1 C_{i,t} + h_2 Y_{i,t} + h_3 B_{i,t} + h_4 L_{i,t} + \varepsilon_{i,3t} \quad (4)$$

In the Model 3:

$$pi = k_0 + k_1 FA_{i,t} + k_2 Y_{i,t} + k_3 B_{i,t} + k_4 L_{i,t} + \varepsilon_{i,3t} \quad (5)$$

7. SAMPLE SELECTION

The sample was chosen from the firms listed on the Tehran stock exchange (TSE), from 2003 to 2012, using the following criteria:

- 1). Firms were listed in TSE during 2005-2014.
- 2). Data was available for all the years under the study.
- 3). The companies didn't have changed the fiscal year for the period studied.
- 4). Banks, Insurance and Investment firms were not considered in this study.

The data used in the analysis were collected from the annual reports of the official bulletins of the Tehran stock exchange. The final sample contains 65 firms.

8. DATA ANALYSIS

Pearson Correlation Coefficient and Multivariate Regression were used to analyze data.

H_0 =normal

H_1 = Data is abnormal

Table (2)
 One-sample Kolmogorov-Smirnov Test

| | | DIV |
|----------------------------------|----------------|-----------|
| N | | 650 |
| Normal parameters ^{a,b} | Mean | .946394 |
| | Std. Deviation | 1.0424150 |
| Most Extreme Differences | Absolute | .074 |
| | Positive | .074 |
| | Negative | -.070 |
| Kolmogorov-Smirnov Z | | 1.212 |
| Asymp. Sig. (2-tailed) | | .106 |

a. Test distribution is normal.

b. Calculated from data.

Following the table (II), Sig = 0.106 > 0.05. Thus results show that data is normal.

8.1. Companies which considers dividend as a fraction of the permanent component of earning.

Testing Results of the first group hypothesis:

Table (3)

Variables Entered

| Model | Variables Entered | Adjusted R Square | Durbin-Watson | Method |
|-------|-------------------|-------------------|---------------|-----------|
| 1 | $B_{i,t}$ | 0.584 | | Step wise |
| 2 | $FA_{i,t}$ | 0.674 | | Step wise |
| 3 | $X_{i,t}^P$ | 0.804 | 1.862 | Step wise |

A total optimum model was used to predict the stock prices considering dividend as a fraction of the permanent component of earning. We entered variables into the model respectively. 3 models were defined and finally the last model (3) including 3 variables was defined as an optimum model for predicting the performance. As a result, the regression model came as the followings:

$$P_i = C_0 + C_1 FA_{i,t} + C_2 X_{i,t}^P + C_3 B_{i,t} + \varepsilon_{i,t} \quad (6)$$

Table (4)

Excluded Variables

| model | Variable | Beta ln | t | Sig | Partial Correlation | VIF |
|-------|-----------|---------|--------|-------|---------------------|-------|
| 1 | $L_{i,t}$ | -0.041 | -1.949 | 0.52 | -0.92 | 1.002 |
| 2 | $Y_{i,t}$ | -0.024 | -1.144 | 0.253 | -0.054 | 1.001 |

As it is seen, $L_{i,t}$ significance level is equal to $0.52 > 0.05$, therefore, this variable was not entering the model. Also $Y_{i,t}$ significance level is equal to $0.253 > 0.05$, therefore, this variable was not entering the model.

Presenting total optimum model based on model 3 (T-test)

Optimum model was model 3, which had a more determination coefficient than the previous ones. In fact, when most variables were beside each other, they could present a more precise prediction of the stock prices and in the first group hypothesis, the optimum model was 3.

Table (5)

Coefficients of model 3

| Model4 | Unstandardized Coefficients | | Beta | t | Sig | VIF |
|-------------|-----------------------------|-----------|--------|---------|-------|-------|
| | B | Stl. Erro | | | | |
| Constant | 770.595 | 120.795 | | 6.379 | 0.000 | |
| $B_{i,t}$ | 0.016 | 0.010 | 0.759 | 21.889 | 0.000 | 2.756 |
| $FA_{i,t}$ | -0.224 | 0.221 | -0.856 | -21.382 | 0.000 | 3.669 |
| $X_{i,t}^P$ | 0.050 | 0.567 | 0.817 | 18.915 | 0.000 | 4.268 |

The optimal regression model was written as the following:

$$P_i = 770.595 + 0.016 Bi - 0.224 FA + 0.05 XP \quad (7)$$

According to the statistical results of the first group hypothesis to test the research, the first group, debts and permanent earning are positive and have a significant impact on the company's market value while financial assets impact is negative and significant. So if the dividend is based on a proportion of permanent earning, it can be argued that increasing the debts and permanent earning, the company's market value will increase. . Meanwhile, based on Table (3) the results of group tests, suggest that, three independent variables of the study have a significant relationship with the company's market value ($F = @. /000$), which together offer a 80% ($AdjR^2 = (802)$) Explains the behavior of the dependent variable.

8.2. Companies which considers dividend as a fraction of the present discounted value of expected future earnings.

Testing Results of the second group hypothesis:

Table (6)

Variables Entered

| Model | Variables Entered | Adjusted R Square | Durbin-watson | Method |
|-------|-------------------|-------------------|---------------|-----------|
| 1 | $L_{i,t}$ | 0.782 | | Step wise |
| 2 | $B_{i,t}$ | 0.926 | | Step wise |
| 3 | $C_{i,t}$ | 0.928 | 1.995 | Step wise |

A total optimum model was used to predict the stock prices while considering dividend as a fraction of the **present** discounted value of expected future earnings. We entered variables into the model respectively. 3 models were defined and finally the last model (3) including 3 variables was defined as an optimum model to predict the performance. As a result, the regression model came as the followings:

$$pi = h_0 + h_1 C_{i,t} + h_3 B_{i,t} + h_4 L_{i,t} + \varepsilon_{i,3t} \quad (8)$$

Table (7)

Excluded Variables

| model | Variable | Beta ln | t | Sig | Partial Correlation | VIf |
|-------|-----------|---------|--------|-------|---------------------|-------|
| 1 | $Y_{i,t}$ | -0.013 | -0.998 | 0.319 | -0.47 | 1.004 |

As it is seen, $Y_{i,t}$ significance level is equal to $0.319 > 0.05$, therefore, this variable was not entering the model.

Presenting total optimum model based on model 3 (T-test)

Optimum model was model 3, which had a more determination coefficient than the previous ones. In fact, when most variables were beside each other, they could present a more precise prediction of the stock prices and in the second group hypothesis, the optimum model was model 3.

Table (8)

Coefficients of model 3

| Model3 | Unstandardized Coefficients | | Beta | t | Sig | VIf |
|-----------|-----------------------------|-----------|-------|--------|-------|-------|
| | B | Stl. Erro | | | | |
| Constant | 1042.553 | 84.123 | | 12.393 | 0.000 | |
| $L_{i,t}$ | 0.004 | 0.032 | 0.681 | 38.442 | 0.000 | 1.946 |
| $B_{i,t}$ | 0.23 | 0.430 | 0.362 | 18.174 | 0.000 | 2.458 |
| $C_{i,t}$ | 0.001 | 0.670 | 0.090 | 3.617 | 0.000 | 3.811 |

The optimal regression model was written as the following:

$$Pi = 1024.533 + 0.004Li + 0.23Bi + 0.001Ci \quad (9)$$

According to the results of statistics the second group hypothesis to test the research, the second group, Liabilities, Investment and operating net cash flow have a positive and significant impact on the company's market value. So if the dividend is based on a proportion of the present discounted value of expected future earnings, it can be argued that increasing the Liabilities, Investment and Operating net cash flow, the company's market value will increase. . Meanwhile, based on table (6) the second group test suggests that ,three independent variables have a significant relationship with the company's market value ($F = @. /000$), which together offer a 92% ($AdjR^2 = .928$) Explains the behavior of the dependent variable.

8.3. Companies which consider dividend as a fraction of the current earning

Testing Results of the third group hypothesis:

Table (9)

Variables Entered

| Model | Variables Entered | Adjusted R Square | Durbin-watson | Method |
|-------|-------------------|-------------------|---------------|-----------|
| 1 | $Y_{i,t}$ | 0.686 | | Step wise |
| 2 | $B_{i,t}$ | 0.737 | | Step wise |
| 3 | $L_{i,t}$ | 0.823 | 2.102 | Step wise |

A total optimum model was used to predict the stock prices while considers dividend as a fraction of the present discounted value of expected future earnings. We entered variables into the model respectively. 3 models were defined and finally the last model (3) including 3 variables was defined as an optimum model to predict the performance. As a result, the regression model came as the followings:

$$pi = k_0 + k_1 Y_{i,t} + k_2 B_{i,t} + k_3 L_{i,t} + \varepsilon_{i,3t} \quad (10)$$

Table (10)

Excluded Variables

| model | Variable | Beta ln | t | Sig | Partial Correlation | VIf |
|-------|------------|---------|-------|-------|---------------------|-------|
| 1 | $FA_{i,t}$ | 0.035 | 1.689 | 0.092 | 0.80 | 1.073 |

As it is seen, $FA_{i,t}$ significance level is equal to $0.092 > 0.05$, therefore, this variable was not entering the model.

Presenting total optimum model based on model 3 (T-test)

Optimum model was model 3, which had a more determination coefficient than the previous ones. In fact, when most variables were beside each other, they could present a more precise prediction of the stock prices and in the third group hypothesis, the optimum model was model3.

Table (11)

Coefficients of model 3

| Model3 | Unstandardized Coefficients | | Beta | t | Sig | VIF |
|-----------|-----------------------------|-----------|--------|--------|-------|--------|
| | B | Stl. Erro | | | | |
| Constant | 1389.166 | 166.533 | | 8.342 | 0.000 | |
| $Y_{i,t}$ | -0.030 | 0.215 | -0.395 | -5.405 | 0.000 | 13.602 |
| $B_{i,t}$ | 0.111 | 0.512 | 0.685 | 18.425 | 0.000 | 3.513 |
| $L_{i,t}$ | 0.69 | 0.334 | 0.843 | 14.794 | 0.000 | 8.250 |

The optimal regression model was written as the following:

$$Pi = 1389.166 - .030Yi + 0.111Bi + 0.069Li \quad (11)$$

According to the statistical results of the second group hypothesis to test the research, the second group, Liabilities and Investment have a positive and significant impact on the company's market value while Book value of equity's impact is negative and significant. So if the dividend is based on a proportion of the present discounted value of expected future earnings, it can be argued that increasing the Liabilities and Investment, the company's market value will increase. Meanwhile, based on Table (9) the results of tests group 1 the third suggests that the three independent variables have a significant relationship with the company's market value ($F = @. /000$), which together offer an 82% ($AdjR^2 = .823$) Explains the behavior of the dependent variable.

9. Conclusion

In this study, the effect of dividend policy has been assessed on company market value of companies listed in Tehran Stock Exchange. In this regard, three models were reviewed of equity valuation models Ohlson, the relationship between earnings, dividends and dividend information content of the evaluation. According to the results of statistical models to test the research, the first model, the Liabilities and permanent earning standing in the market value of the company were extremely positive and significant, while financial assets were negative and significant. Thus, while the proportion of dividend earning is permanent, it can be claimed that the increase in Liabilities and permanent earning would increase the company's market value. In the second model, Liabilities, the net operating cash flow and Investment on market value of the company were positive and significant. So when the dividend is based on a proportion of the present discounted value of expected future earning, it confirms this

with the increase in Liabilities ,the net operating cash flow and Investment, and the company's market value will increase. And finally, the third model, the relationship between the significant and positive market value and Investment Company, and Liabilities showed that the company's book value of equity is negative and significant. Thus it can be concluded that when the dividend is based on the proportion of current earning, with the increase in Liabilities investments the company's market value will increase. These results are consistent with the results of the, Yun-sheng & et al (2005) study, that reviewed ". The relationship between dividend policy and equity valuation models" were not experimental results of their research. It says that for the three models developed, all three models, book value of equity, Liabilities and investment were mainly positive and the stock price for the total sample are related.

And it also confirms the results of comparing the three models show that, the anatomical features of the second model's ability to predict market value are more than the other models. Such a conclusion is also consistent with the results of the Yun-sheng & et al (2005) study that reviewed "The relationship between dividend policy and equity valuation models, also found, anatomical features and the ability of the model to predict the market value to be more than the other two models.

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APPENDIX

First group hypothesis:

Table (1)

Model Summary^d

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1 | .764 ^a | .584 | .583 | 3606.03550 | |
| 2 | .806 ^b | .649 | .647 | 3315.04402 | |
| 3 | .897 ^c | .805 | .804 | 2472.12994 | 1.862 |

- a. Predictors: (Constant), Bi
- b. Predictors: (Constant), Bi, FA
- c. Predictors: (Constant), Bi, FA, XP
- d. Dependent Variable: Pi

AN OVA^d

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1 | Regression | 8.17E+09 | 1 | 8168542466 | 628.181 | .000 ^a |
| | Residual | 5.83E+09 | 448 | 13003492.06 | | |
| | Total | 1.40E+10 | 449 | | | |
| 2 | Regression | 9.08E+09 | 2 | 4540896439 | 413.203 | .000 ^b |
| | Residual | 4.91E+09 | 447 | 10989516.85 | | |
| | Total | 1.40E+10 | 449 | | | |
| 3 | Regression | 1.13E+10 | 3 | 3756136902 | 614.609 | .000 ^c |
| | Residual | 2.73E+09 | 446 | 6111426.462 | | |
| | Total | 1.40E+10 | 449 | | | |

- a. Predictors: (Constant), Bi
- b. Predictors: (Constant), Bi, FA
- c. Predictors: (Constant), Bi, FA, XP
- d. Dependent Variable: Pi

Table (3)

Residuals Statistics^a

| | Minimum | Maximum | Mean | Std. Deviation | N |
|----------------------|------------|-----------|-----------|----------------|-----|
| Predicted Value | -2252.0671 | 79604.852 | 1848.6179 | 5009.65898 | 450 |
| Residual | -15700.22 | 26149.961 | .0000 | 2463.85732 | 450 |
| Std. Predicted Value | -.819 | 15.521 | .000 | 1.000 | 450 |
| Std. Residual | -6.351 | 10.578 | .000 | .997 | 450 |

- a. Dependent Variable: Pi

Second group hypothesis:

Table(4) **Model Summary^d**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1 | .884 ^a | .782 | .782 | 3002.75317 | |
| 2 | .963 ^b | .926 | .926 | 1746.84244 | |
| 3 | .964 ^c | .929 | .928 | 1723.54814 | 1.995 |

- a. Predictors: (Constant), Li
- b. Predictors: (Constant), Li, Bi
- c. Predictors: (Constant), Li, Bi, Ci
- d. Dependent Variable: Pi

Table(5) **Residuals Statistics^a**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|----------------------|-----------|-----------|-----------|----------------|-----|
| Predicted Value | 1041.2042 | 73333.289 | 2439.0013 | 6193.46497 | 447 |
| Residual | -16987.70 | 14397.905 | .0000 | 1717.74168 | 447 |
| Std. Predicted Value | -.226 | 11.447 | .000 | 1.000 | 447 |
| Std. Residual | -9.856 | 8.354 | .000 | .997 | 447 |

- a. Dependent Variable: Pi

third group hypothesis:

Table(6) **Model Summary^d**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1 | .829 ^a | .687 | .686 | 4555.49242 | |
| 2 | .859 ^b | .739 | .737 | 4165.52548 | |
| 3 | .908 ^c | .825 | .823 | 3415.51691 | 2.102 |

- a. Predictors: (Constant), Yi
- b. Predictors: (Constant), Yi, Bi
- c. Predictors: (Constant), Yi, Bi, Li
- d. Dependent Variable: Pi

Table(7)
ANOVA^d

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1 | Regression | 2.04E+10 | 1 | 2.037E+10 | 981.694 | .000 ^a |
| | Residual | 9.30E+09 | 448 | 20752511.16 | | |
| | Total | 2.97E+10 | 449 | | | |
| 2 | Regression | 2.19E+10 | 2 | 1.096E+10 | 631.457 | .000 ^b |
| | Residual | 7.76E+09 | 447 | 17351602.49 | | |
| | Total | 2.97E+10 | 449 | | | |
| 3 | Regression | 2.45E+10 | 3 | 8155602161 | 699.106 | .000 ^c |
| | Residual | 5.20E+09 | 446 | 11665755.76 | | |
| | Total | 2.97E+10 | 449 | | | |

- a. Predictors: (Constant), Yi
- b. Predictors: (Constant), Yi, Bi
- c. Predictors: (Constant), Yi, Bi, Li
- d. Dependent Variable: Pi

Table(8)
Residuals Statistics^a

| | Minimum | Maximum | Mean | Std. Deviation | N |
|----------------------|-----------|-----------|-----------|----------------|-----|
| Predicted Value | 402.6832 | 74736.992 | 3055.4441 | 7381.85437 | 450 |
| Residual | -22248.52 | 28273.992 | .0000 | 3404.08737 | 450 |
| Std. Predicted Value | -.359 | 9.711 | .000 | 1.000 | 450 |
| Std. Residual | -6.514 | 8.278 | .000 | .997 | 450 |

- a. Dependent Variable: Pi