The Study of a Multivariable Regression Model
Regarding Dividend Policy in Capital Market

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Abstract

Purpose of this article is study of multivariable regression model regarding dividend policy. First of all, the Hypothesis designed based on conceptual framework and then they tested in Tehran Stock Exchange(T.S.E) during 2005 to 2009. Multivariable regression analysis was applied for statistical analysis.

The finding of study show that there is a meaningful relationship between dividend policy and return on stock but there is no meaningful relationship between dividend policy with firm size and book value to market value of equity ratio.

Also, The finding show that is a meaningful and reverse relationship between asymmetric information and dividend policy.

Keywords: a multivariable regression, asymmetric information, dividend policy, capital market.

1- Introduction

This paper study this issue that how asymmetric information can has effect on dividend policy by testing the relationship between asymmetric information and dividend policy. Dividend policy has been complicated problem for financial economist. Modigliani & Miller (1961) observed dividend policy has no effect on stock values in efficient markets [15].however , observations state that stock price can be increased when the suggestion for payment of dividend comes up and the dividend policy is important after other information. Some studies have various
suggestions for impalement specific dividend policy. The dividend signal theory is one of the most famous theories between them. Upon The signaling model Bhattacharya (1979), Williams & John (1985), Rock & Miller (1985), managers know more about the real value of the firm than investors and they direct the information in the market for dividend policy. Thus, this model suggests a direct relationship between asymmetric information and dividend. Many researches have done about signaling theory for profit dividing. Maybe this study is the first one in Iran that tests signaling model on asymmetric information and dividend policy. [2][10][16]

This question is asked to lead the study: Does Asymmetric information has effect on dividend policy? Asymmetric information is a main defect in capital market and taking a specific dividend policy is one of the most important decisions in firm. So, the above question is an important. Recent study uses the dividend prediction mistake and dispersion analysis to measure Asymmetric information between managers and investors.

2- Literature review

The paper studies on this question that how asymmetric information has effect on dividend policy in firms, by testing the relationship between asymmetric information and dividend policy. Dividend has complicated problem for financial statisticians. Modigliani & Miller (1961) proved that dividend policy is unrelated to stock value in efficient market. However Observations state stock price can be increased when the suggestion for distribution of dividend comes up. Some studies have various suggestions for handling profit dividend. The dividend signal theory is one of the most famous theories between them.

Existence and concepts of asymmetric information in financial markets are vast issue in financial literature. Two main topics in this literature are:

1: firm personals distinction that they gain by the information.
2: Dividend policy is Related to asymmetric information.

Dividend policy in a firm can has relationship with gained profit by personals; both of them depend on level of asymmetric information between the personals in a firm and external investors. [11]

Jaffe (1974), Finnrty(1976), Seyhun(1986), Jeng , Metrick , Zeckauser (1995) Lakonishok, Lee(2001) have collected some examples that show internal personals gain a high abnormal profit to their firms stock. Although the measurement of this profit is very difficult [6],[5],[7],[17],[13]

The second theory is formed by three theories about the role of dividend policy in financial market. The first theory is "free cash flow theory" about dividend not only this theory is about the contrast between the managers gains stock holders gains but also focus on profit dividing as a basic element to reduce the cost of delegation.[8],[3]

The second theory is "institutional monitoring theory" by Allen, Bernard & Welch (2000). This theory based on two hypotheses. The first, basic firm investors by manager monitoring are more successful than external investors. The second, because of tax effects basic investors prefer a higher dividend
The last theory is "information signaling theory", and suggests dividend reduces the asymmetric information by signaling mechanism. On the base of signaling theory Batacharia (1979), Rock & Miller (1985), Williams and John (1985), John and Lang (1971) say: managers know more about the real value of the firm than investors and they direct the information in the market by profit dividing. Thus, this model suggests a plus relationship between asymmetric information and dividend policy.[2],[16],[10],[9]

Kang & King tested the relationship between asymmetric information and gained profit by personals during 1982 to 1995 for public corporation that SEC reported their internal exchanges. The examples showed dividend ascertained by personals profit and asymmetric information. Finding indicated firms with high dividend had lower personals profit and asymmetric information. These results found by "free cash flow theory" and "institutional monitoring theory". Generally, the results of study are: 1) dividend level is an important element for personals profit rather than the decision for dividend payment. 2) Institutional monitoring theory is not a suitable dividend policy to explain the relationship between the dividend level and asymmetric information, but free cash flow theory is the best one to explain dividend changes to assertion asymmetric information. At last there is a few evidences for this topic that dividend changes level can be a sign of asymmetric information reduction.[11]

Khang & King (2006) showed amount of dividend has a meaningful and negative correlation with efficiency of personals exchanges. Information signal theory doesn't accept the result of this research.[12]

Li & Zhao (2007) researched to figure out how asymmetric information effects on dividend policy. They studied some examples from IBES files during 1983 to 2003. The examples were included the observations of 22413 firms. Measurement was include of profit predict mistake and dispersion of deviations. Last researches showed a positive correlation between predict deviation and asymmetric information. It had been estimated if well use signaling theory for profit dividing, it will be a exact description of reality. Thus, the dividend policy of firms should have a positive and meaningful relationship with mistake and dispersion of profit prediction. The finding states that with permanent of other factors, the firms with more asymmetric information have lower probability for dividend payment, they start to distribution of dividend and increase it, but these firms divide a lower amount of profit for their investors. Likewise, findings show there is a weak and negative relation between recall stock and amount of asymmetric information.[14]

2- Purposes and hypotheses of the study
The main purposes of the study are:
1- Research on the effect of asymmetric information on dividend policy in accepted corporations in Tehran Stock Exchange organization.
2- Ascertain the other effective elements on dividend policies in accepted corporations in Tehran Stock Exchange organization.

The below hypotheses have suggested to arriving to these purpose:
Hypothesis 1: There is a meaningful relationship between dividend policy and asymmetric information in Tehran Stock Exchange organization.

Hypothesis 2: There is a meaningful relationship between dividend policy and equity book value to market value ratio in Tehran Stock Exchange.

Hypothesis 3: There is a meaningful relationship between dividend policy and firm size in Tehran Stock Exchange organization.

Hypothesis 4: There is a meaningful relationship between dividend policy and dividend profitability in Tehran Stock Exchange organization.

4- Research variables

The relation between dividend policy and asymmetric information will be tested by signaling model. Because the asymmetric information effect is quantifiable, the firms with high amounts of asymmetric information must have higher dividends. If Signaling theory after controlling all other elements effecting dividend payment still has valid, we can find a positive relationship between asymmetric information and dividend policy. So, signaling theory predicts a strong and positive relationship between asymmetric information.

4-1: Measurement of dividend policy

To find out the role of asymmetric information in dividend policy, the study focuses on annual profit payment, dividend has higher possibility to have information content. All annual dividends for common stock will be collected after change in amount of issued stock. We have used the DPS/EPS ratio to study about the effect of dividend policy that shows the percent of distributed dividend. In other words, it shows that the firm distributed how percent of gained profit to investors.

4-2: Measurement of asymmetric information

The study uses the predict mistakes and real profit dispersion of firm compared with predicted profit to analyze asymmetric information. Elton, Gruber and Gultekin showed the largeness of predict mistakes are related to mistake of special factors of the firm. Their finding suggest: predict mistakes are acceptable approximation for amount of asymmetric information. (4)

On the base of research by Li and Zhao(2007), in this study we use predicted profit standard deviation to real profit as a quantity criterion for asymmetric information measurement. The profit predicted mistake is the exact difference between the average predicted profit and real profit. Thus, we need firm that have information about real profit, predicted profit and dividend for examples [14]
Multivariable regression model

4-3: The other effective variable on firm dividend policy

Li and Zhao (2007) to study on asymmetric information also entered the profitability, size and potential growth that have effect on dividend. Current research also for control other effective variables on dividend policy entered size, potential growth (BV/MV ratio) and profitability variables on its model. Forgoing variables are used in research in following manner:

a) Book value to Market value of equity ratio (BE/ME)
At the first the equity and common stock assertion by the information of the last balance sheet, then we calculate the market value of equity ratio by multiplies the last price of common stock in number of issued stock. after that book value of equity divided to its market value to earn this ratio.

b) Firm size
There are various methods to assertion the firm size. For example, someone uses total assets of the firm. Some times the sell value of the firm are used for firm size. Like Fama and Franch in this research, the market value of equity are utilize as the firm size and it's calculate by multiple the last market price of stock in number of common stock. Because the firm size is very bigger than other variables, we use a logarithm of market equity ratio to bring it near to the other variable size.

c) Profitability
Profitability is being calculated by dividing the common Stock net income for the year ended to "t" to book value of common stock.

5- Statistical society and sample
We use the financial statements information of the accepted corporation in Tehran stock exchange organization during 2005 to 2009 to test the relationship between dividend policy and asymmetric information. The bankrupt firms are removed from the sample, also the firms with out EPS prediction for these years are removed from the sample. The data of 108 firm are used in the study for analysis.

6 -Methodology
Because the study tries to find the relation between the asymmetric information and dividend policy variables, so Methodology include a type of correlation and uses a multivariable regression model to analyze the data. The regression model of the study is:

\[ \text{Dividend policy} = b_0 + b_1 \text{AI} + b_2 \text{firm size} + b_3 \text{BV/MV} + b_4 \text{profitability} \]

That \( \text{AI} \) = Asymmetric Information
Because for determining dividend policy was used of the percent relation of the dividend policy, therefore the model is released in following manner:

\[ \text{DPS/EPS} = b_0 + b_1 \text{ AI} + b_2 \text{ firm size} + b_3 \text{ BV/MV} + b_4 \text{ profitability} \]

### 7-Finding of the research

The study hypotheses test has done by using multivariable regression analysis. Before the testing the study hypotheses, regression hypotheses related test has done. These hypotheses includes:

- a) The random variable of mistakes has normal distribution
- b) The mistake variances are equal
- c) The mistakes are independent

The test showed that above hypotheses are confirmed. Results of the statistic hypotheses tests are in the table 1.

**Table 1** : Results of the statistic hypotheses tests

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X4_PROF</td>
<td></td>
<td>Stepwise (Criteria: Probability of F-to-enter &lt;= .050, Probability of F-to-remove &gt;= .100).</td>
</tr>
<tr>
<td>2</td>
<td>X1.AI</td>
<td></td>
<td>Stepwise (Criteria: Probability of F-to-enter &lt;= .050, Probability of F-to-remove &gt;= .100).</td>
</tr>
</tbody>
</table>

Table 1 shows the results of "stepwise static hypothesis test". The best regression model and independent variable that use in regression model can be determined by this test. The results show that just two variables- asymmetric information and stock profitability- are effectible factors on dividend policy that can enter to the model.
**Table 2:** the cause of expel the book value to market value of equity ratio and firm size variable

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Partial Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X1_AI</td>
<td>-.431a</td>
<td>-7.393</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>X2_BV_MV</td>
<td>-.024a</td>
<td>-.466</td>
<td>.642</td>
</tr>
<tr>
<td></td>
<td>X3_FS</td>
<td>-.012a</td>
<td>-.253</td>
<td>.801</td>
</tr>
<tr>
<td>2</td>
<td>X2_BV_MV</td>
<td>.075b</td>
<td>1.508</td>
<td>.132</td>
</tr>
<tr>
<td></td>
<td>X3_FS</td>
<td>-.062b</td>
<td>-1.419</td>
<td>.157</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>1</td>
<td>.542</td>
</tr>
<tr>
<td>2</td>
<td>.963</td>
</tr>
</tbody>
</table>

a. Predictors in the Model: (Constant), X4_PROF
b. Predictors in the Model: (Constant), X4_PROF, X1_AI
c. Dependent Variable: Y_PD

The results in table 2 explain the cause of expel the book value to market value of equity ratio and firm size variable. In BV/MV case with due attention to the "t" parameter –.466 and significant level .642 , the beta coefficient for this variable is not meaningful. Thus, it removed from model.

**Table 3:** the correlation after removing the variables that has increased.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.293a</td>
<td>.086</td>
<td>.084</td>
<td>.27544</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.432b</td>
<td>.187</td>
<td>.183</td>
<td>.26011</td>
<td>2.086</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), X4_PROF
b. Predictors: (Constant), X4_PROF, X1_AI
c. Dependent Variable: Y_PD

Table 3 shows the correlation after removing the variables that has increased. Durbin Watson parameter is 2086 which shows the model works better with two remaining variables.
Table 4: Test of meaningfully of all the independent variable coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>3.146</td>
<td>1</td>
<td>3.146</td>
<td>41.468</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>33.534</td>
<td>442</td>
<td>.076</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36.680</td>
<td>443</td>
<td>.076</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>6.844</td>
<td>2</td>
<td>3.422</td>
<td>50.577</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>29.837</td>
<td>441</td>
<td>.068</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36.680</td>
<td>443</td>
<td>.068</td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), X4_PROF
b. Predictors: (Constant), X4_PROF, X1_AI
c. Dependent Variable: Y_PD

The results of table 4 are about the test of meaningfully of all the independent variable coefficients. Results show that variable coefficients are meaningful on level of confidence .99 , before and after removing variables.

Table 5: The final results of regression model. The above table shows two models of the final model

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>.655</td>
<td>.017</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X4_PROF</td>
<td>.059</td>
<td>.009</td>
<td>.293</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>.620</td>
<td>.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X4_PROF</td>
<td>.119</td>
<td>.012</td>
<td>.585</td>
</tr>
<tr>
<td></td>
<td>X1_AI</td>
<td>-7.50E-05</td>
<td>.000</td>
<td>-.431</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Y_PD

Table 5 shows the final results of regression model. The above table shows two models of the final model. With due attention to the above results, the final regression equation is:

Dividend policy =.620 - .000075 AI +.119 profitability

7-The test of study hypothesis
With due attention to the above results, test of each hypothesis has been done separately.

Test of hypothesis 1:
\[ H_0 : \beta_1 = 0 \]
\[ H_1 : \beta_1 \neq 0 \]

\( H_1 \) hypothesis explain that there is a meaningful relationship between dividend policy and asymmetric information. As the result in table 2, \( H \) hypothesis reject on the .95 meaningful level \((\alpha > p\text{-value}, .05 > 0.00)\). In the other hand, there is a meaningful relationship between dividend policy and asymmetric information. Also there is a reverse relationship between dividend policy and asymmetric coefficient with due attention to negative of asymmetric coefficient. Beta standardized coefficient is - .431 and shows that .431 of change in dividend policy deviation explain by change in asymmetric information.

Test of hypothesis 2:
\[ H_0 : \beta_2 = 0 \]
\[ H_1 : \beta_2 \neq 0 \]

\( H_1 \) hypothesis explains, there is a meaningful relationship between dividend policy and BV/MV. As the results in table 2, \( H \) hypothesis cannot be rejected on .95 meaningful level \((\alpha > p\text{-value}, .05 > .642)\). in the other hand, there is no relationship between dividend policy and BV/MV.

Test of hypothesis 3:
\[ H_0 : \beta_3 = 0 \]
\[ H_1 : \beta_3 \neq 0 \]

\( H_1 \) hypothesis explains, there is no a meaningful relationship between dividend policy and firm size. As the results in table 2, \( H \) hypothesis cannot be rejected on .95 meaningful level \((\alpha < p\text{-value}, .05 < .801)\). In the other hand, there is no relationship between firm size and dividend policy.

Test of hypothesis 4:
\[ H_0 : \beta_4 = 0 \]
\[ H_1 : \beta_4 \neq 0 \]
H₁ hypothesis explains, there is a meaningful relationship between dividend policy and stock profitability. As the results in table 5, H₁ hypothesis rejected on .95 meaningful level (α > p-value, .05 > 0.00). In the other hand, there is a meaningful relationship between dividend policy and stock profitability. This relationship is direct with due attention to positive amount of profitability coefficient. Standardized beta coefficient is .585 and shows that .585 of change in dividend policy deviation explained by change in stock profitability.

<table>
<thead>
<tr>
<th>Residuals Statisticsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Value</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Std. Predicted Value</td>
</tr>
<tr>
<td>Std. Residual</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Y_PD

Histogram

Dependent Variable: Y_PD

Regression Standardized Residual

Normal P-P Plot of Regression Stand

Dependent Variable: Y_PD
8- Discussion and Conclusion

The study is about the effect of asymmetric information on dividend policy. Analysis based on signaling model. This model explains managers know more about the real value of the firm than investors and they direct the information in the market by profit dividing. Book equity to market equity ratio (BE/ME) variable, firm size variable and stock profitability variable are the control variables. Results of study explain there is a reverse and meaningful relationship between dividend policy and asymmetric information. It mean, increasing the asymmetric information reduce the dividend between investors. Also the contrary of this relationship is right. The results are compatible with signaling model. The results of last studies by Batcheria (1979), Rock, Miller, William and John (1985), John and Long (1991), Kang and King (2002) explain there is a meaningful and positive relationship between dividend policy and asymmetric information, and results of this study has not conformity with them. But it's conformity with study of Lee and Jaho (2007). With due attention to the relationship between dividend policy and asymmetric information, there is a probability that managers and subordinates effect on the policies to increases their profit. Other finding explain that in control variables that have a probability of effect on dividend policies just stock profitability has affect on dividend policies. The firm size variable and BE/ME variable have no affect on profit dividing for common stock holders.

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