EFFECT OF SHORT AND LONG TERM DEBT TO PROFITABILITY IN THE MINING INDUSTRY LISTED IN JSX

Hendri Dwilaksono
Student of Graduate Program, Master of Management, D Building, VII Floor
Jl. Kiai Tapa No. 1 Grogol, West Jakarta 11440,
email: pascasarjana@trisakti.ac.id, (021) 5664166, Fax. (021) 5668640.

ABSTRACT
The objective of this research is to find the influence of Short Term Debt and Long Term Debt on Return On Equity in mining industry listed in Indonesia Stock Exchange. This research used qualitative and quantitative methods, meanwhile this analysis of data processing used regression analysis by SPSS program. Mining industry Companies listed in Indonesia Stock Exchange in 2003-2007 had chosen as the population of this research. Data analysis applied measuring method by regression analysis model then be estimated by ordinary least square. The analysis result as individual shows Short Term Debt variable have a positive influence and significant on Return On Equity. Long Term Debt variable have a negative influence and significant on Return On Equity. The analysis result as simultaneous shows there is influence of Short Term Debt and Long Term Debt to Return On Equity. Long Term Debt variable is a dominant variable influences to Return On Equity.

Keywords: Long term, profitability, return on equity, short term.
INTRODUCTION

In the conduct of operational activities, either through development or expansion would require fund companies are not small. The problem often faced by many companies is the limited amount of money, so as to meet the needs of the company must seek financing from sources outside the company. Basically there are opportunities for the business sector to obtain funding, to develop their business. Selection of source of funds is a fairly complicated problem for management, because this type of source of funds will be used to have close links with various aspects. The funding pattern that can be done in order to fund its business enterprise there are 2 sources, namely financing from its own capital through asset owner’s deposit company, selling shares to the public, operating income is not distributed, and reserve. While the funding source of foreign capital is through loans to banks, issuance of shares / bonds or third-party loans. Listen Read phonetically Capital Markets is a market for the sale of securities and shares of long-term debt securities and other derivative products. Capital market activities intended to: accelerate the process of expanding people’s participation in stock ownership, equity income communities through the intermediary of share ownership and to further encourage public participation in the mobilization of funds to be used productively. Listen Abor (2005), did research on the effects of capital structure on profitability with the object of research company registered in Ghana, in this study the used variables include ROE dependent variable and independent variables namely; EBIT, short-term debt, long term debt, total debt, company size and sales growth. The results show that the variable EBIT, short-term debt, long term debt, total debt, size of company and sales growth affect ROE.

Referring to research conducted by Abor, researchers want to conduct research with the object of mining industry companies listed in Indonesia Stock Exchange during the period of 2003-2007. The variables used in this study include the independent variables and dependent variables. Independent variables consist of a) short-term debt and b) long term debt, while the dependent variable (return on equity / ROE). Based on the background of the problem in this study the authors wanted to know how to influence short-term debt and long term debt either partially or simultaneously to the ROE in companies incorporated in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period? And which variables are most dominant influence on the company’s ROE is incorporated in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period?.

The purpose of this study is to investigate the influence of short term debt and long term debt either partially or simultaneously to the ROE in companies incorporated in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period and to determine which variables most dominant influence on ROE incorporated companies listed in the Mining Industry in Indonesia Stock Exchange-year period 2003-2007. The benefits of this research is scientifically expected to become an input for the development and assessment of the concept of how the aspects related to the ROE, short-term debt and long term debt. While the practical benefits, this research is expected to be used as input for the managers / management companies and investors in companies incorporated in the Mining Industry.
THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Spending. Spending is an overall enterprise activities to raise funds and to use or allocate it (Riyanto 2003). It was as described by Husnan (2001) that the insurance company is an established price if the company sold. Spending Function. According Riyanto (2003), there are two functions in the company’s spending, which function the use of funds or allocation of funds (Use / allocation of funds). These functions include planning and controlling fungi use of assets in both current assets and fixed assets. Function meet the needs of the fund or function of funding (financing: obtaining of funds). Is a function where the fund company can be met or provided from internal company sources and external source company. Types of Capital. According Riyanto (2003), capital can be obtained in two ways, namely by using funds from the owner or prospective owner called with equity financing, and expenditure of foreign capital or debt referred to debt financing.

Equity. Capital itself is essentially derived from capital owners and are embedded in the company for an unspecified length of time. According to Weston and Copeland (2002). Own capital in an enterprise consists of: 1) Share Capital. Stock is proof of taking part or mark the delivery of funds. In a form of limited liability companies. As for the types of shares are: a) ordinary shares (Common Stock); b) preferred stock (Preferred Stock); c) cumulative preferred stock (Preferred Stock deconcolidated). 2) Retained earnings. Gains derived by a company may in part be paid as dividends and partly retained by the company. The existence of profit will increase retained earnings (profits retained) that this means it will increase their own capital. 3) Foreign Capital. Foreign capital is capital that comes from outside the company who are temporarily working in the company, and for the relevant company is debt capital, which in turn must be repaid. The types of debt are: a). Foreign capital or short-term debt. Is foreign capital (debt/credit) with maturities no longer than 1 year. b). Foreign capital or long-term debt. Is foreign capital (debt/credit) which the period is more than one year. Capital Structure. Capital structure is the balance between the amount of short-term debt is a permanent, long-term debt, preferred stock and common stock. While the financial structure is a balance between the total debt with its own capital (Sartono, 2001) Capital structure by Zainul Arifin (2005) is a combination of debt and equity in the company’s long term financial structure. On the debt ratio or leverage ratio describes the ratio of debt and equity at a certain moment, while describing the target capital structure over the composition of debt and equity in the long term in a company.

Based on the results of research on the relationship between capital structure with the value of a company that carried out by Mogdiliani and Miller (MM theory) can be concluded that the insurance company is not affected by capital structure (Sartono, 2001). Several subsequent studies of Sartono (2001) tried to evaluate the MM model and concluded that the use of debt it will increase the value of a company. But at a certain point, the company will begin to decline by the larger proportion of debt in their capital structure. Capital or funds used by the company according to Sartono (2001) always has a cost or known by the term cost of capital. Cost of Capital is the capital cost incurred by companies to obtain capital from: (a) Cost of Debt explains how costly it is to be issued by the company due to the use of debt. The cost of debt is called interest expense will decrease the amount of taxable income
Thus the use of debt is to reduce the tax to be paid. This is a benefit for the company to use debt than equity, (b) Cost of Preferred Stock is the cost of the implied rate of profit (required rate of return) by the holders of preferred stock, (c) Cost of Retained Earning is a fee of rates of return implied investors in the company’s common stock, (d) Cost of Issuing Common Stock represents a higher cost than the cost of retained earnings from the sale of new shares require a launch or stock issuance costs (floating cost). These fees will reduce revenue from the sale of shares, (e) Weighted Average Cost of Capital is an overall cost or total cost incurred to obtain firm capital (cost of debt + preferred stock + the cost of retained earnings costs + cost of new shares) to calculate the cost of weighted average capital. According to Arifin (2005), there is a relationship between bankruptcy costs on capital structure, namely: (a) The greater the interest cost incurred by the company, the more likely the company experienced financial difficulties that led to the bankruptcy, (b) At a certain point, risk over the rising cost of bankruptcy to lower the value of a company. Bankruptcy costs include legal fees, accountant fees and administrative costs, (c) The increased possibility of bankruptcy will result in increased costs of debt and equity capital costs. Both the shareholders and bondholders will require a higher level of profit if it increases the possibility of bankruptcy. Bond (bond) by Weston et al. (2001) are debt securities issued by companies that can be traded on the stock exchange, and has a maturity of more than 1 year, typically 3 to 7 years. Based on its safety, the bonds can be divided into 2 types, namely (Jones, 2000): (1) Or Secure mortgage bonds, are bonds secured by a group of corporate assets. If the bond issuer defaulted, the bondholders could force the company to sell or take over the pledged assets to pay liabilities of the issuance of bonds, (2) A debenture or Unsecured bonds are bonds issued by not guaranteed by specific assets. Capital stock by Gitman (2000) is a stock that reflects the interests of shareholders as owners of companies that stated in the certificate of shares. This stock certificate issued by the company itself.

Preferred Stock by Weston et. al. (2001) is a stock that provides income in the form of dividends are relatively fixed in comparison with ordinary shares. Holders of preferred shares have priority in receiving dividends. According to Brigham et. al. (2001) Ordinary shares (common stock) is proof of ownership of the companies in which the holder to earn income from dividends distributed by companies or from capital gains. Capital structure decision-making according to Weston (2001) is influenced by four main factors: (1) Business Risk operating company if the company is not using debt. The greater the business risk, then the lower the optimal debt ratio; (2) The second key factor is the company’s tax position. The main reason for using debt is a reduction in interest rates, where the use of low-cost debt; (3) The third important consideration is financial flexibility. The ability to raise capital with reasonable terms under adverse conditions. Theory of capital structure according to Van Horne (Sartono, 2001) about the effect of changes in capital structure of the value of the company there are 3 approaches regarding capital structure are: (1) Traditional Approach; (2) Net income Approach; (3) Modigliani - Miller Position.

Traditional approach, this approach assumes that at a certain leverage, firm risk has not changed. However, after a certain leverage or debt ratio unchanged, the cost of debt and equity capital cost increases. Increased cost of equity capital will be getting bigger and bigger even than the decrease in costs due to the use of cheaper debt. As a result, capital cost weighted average initially decreases and
after a certain leverage changes, it will increase. Therefore, the value of the company that first rose to decline as a result of greater use of debt.

Net Income Approach, this approach assumes that the cost of debt and equity capital cost that is constant despite the change in capital structure. Cost of debt before taxes will be lower than the cost of equity capital, because the debt is less risky than their own capital. If the company leverage to increase the company’s overall cost of capital will fall. The use of the increasingly large debt in capital structure will result in the company’s overall capital cost is lower so that the enterprise value will be higher. Modigliani - Miller Position. MM was first introduced the theory of capital structure, assuming no corporate income tax. With this assumption MM stated that: (1) The value of an enterprise and capital cost weighted average is independent of capital structure in equilibrium; (2) The bigger the debt, the greater the cost of capital itself, this is because the investors face greater risks; (3) Companies should invest in new projects along the value of firms increases. Modigliani and Miller also developed the theory of capital structure by incorporating the assumption that there is corporate income tax. With this assumption MM concluded that the larger companies using debt, it will increase the value of a company. Short-term debt will be returned in due time of less than 1 year. Short-term debt can only be used to finance short-term investments also.

Long-term loans will be expected to be repaid in a period of more than 1 year. Long-term loans can be used to finance working capital or fixed asset financing. There are several factors to consider in using debt financing to finance the business activities of a business, namely: (a) Cost, (b) Risk, (c) The conditions specified creditors, (d) The rate of inflation, (e) Profitability, (f) Liquidity position, (g) security business.

It is in money market securities issued by large banks and capitalized companies. There are four basic forms of commercial paper are (1) Promissory notes payable; (2) Czech; (3) Deposits; (4) Promissory notes (bank draft). The definition of commercial paper in Indonesia is defined as a short-term bonds with maturities ranging from 2 to 270 days, issued by a bank or company or other borrowers to investors who have cash for a while. Pecking order theory. Pecking order theory by Brigham et. al., (2001) is a theory that explains the model of capital structure trade-offs are consistent with the search for optimal capital structure for firm value can be maximized. This model is still considered the mainstream theory of capital structure, but this model has not been able to answer some of the findings from the pattern of capital structure in the company by reason of: (1) In every industry was found that the companies highest corporate profitability is the lowest debt ratio. This is contrary to the prediction of a trade-off model that predicts the company will choose debt funds with a record of the benefits gained from the additional debt is still greater than the disadvantages. This means the higher the profitability the higher the level of use of debt (debt ratio); (2) Increasing the portion of debt is always associated with the existence of positive abnormal return that is big enough for shareholders, while debt reduction would push the stock price decline. This is contrary to the predictions of trade-offs that predict that if the increase in debt carried by the company it will be to raise or lower the stock price depends on the portion of its debt. If the portion of corporate debt is not optimal then by an increase in debt they will make the stock price rises. But if the portion of corporate debt is optimal, the increase in debt will lower stock prices.
Signaling Theory and the Model Asymmetric information. The model is based on the idea that managers who have good information about the company will try to transmit the information to outside investors for the stock price increases. But because there is asymmetric information problem, then the manager can not just announce it was good information because it could be another company manager also announced the same thing that makes foreign investors become less confident (Weston et. al., 2001) One solution according to Prayogo (2002) which can be used managers who really have good information about the company is to provide a signal to investors by engaging in any act or policy that can not be imitated by firms that do not have information as good information company.

The finding that the leverage ratio inversely correlated with profitability contrary to the predictions of signaling models. Where this model predicts that high corporate profitability will give a signal by using a large portion of debt, means the correlation between debt ratio and profitability is positive (Arifin, 2005). Several theories explaining the effect of dividend on the company’s stock price is (Brigham et. al., 2001): (1) Irrelevant Theory. This theory was developed by Mogdiliani and Miller (MM), which states that in a given condition investment decisions, dividend payments do not affect the prosperity of our shareholders. Meanwhile, the decision whether profits will be distributed in the form of dividends or retained into retained earnings, does not affect firm value; (2) Bird in the Hand Theory. This theory was presented by Myron Gordon and John Litner, who argued that the expected return is expected by the holders of common stock will increase as a result of reduction in dividend payments; (3) Tax Differential Theory. Since dividends tend to be taxed higher than capital gains, then investors will ask for a higher expected return for stocks with high dividend yield.

Profitability is also a variable that affects the capital structure. According to Weston and Copeland (2001), profitability is the ratio of the effectiveness of management based on the returns generated from sales and investment. Effectiveness was assessed by relating net income to assets that were used to generate profit. Riyanto (2003) states that the ROE is the ability of a company with its own capital to work in it to make a profit. It can be concluded that the ROE is the ratio between the amount of income available to owners of companies with total capital has been invested in the company. The formula is formulated as follows:

\[
\text{ROE} = \frac{\text{EAT}}{\text{Ekuitas}} \times 100\%
\]

High ROE tend to have a comparison between the stock price to book value is high and vice versa (Higgins, 2000). Relevant Previous Research Review. Results of previous studies by Titman (Santi, 2003) states that affecting the company’s capital structure are the factors that generally affect the company’s sources of funding that is affected by the tax shield, growth, uniqueness, industry classification, size, earnings, volatility, and profitability, but which uniqueness significantly affecting the capital structure. Determinants of capital structure by Rajan (Pao et. al., 2003) is the asset structure, investment opportunities, size and profitability. Rajan find relationships that leverage increases with asset structure and size but decreases with growth opportunities and profitability. While other studies conducted by Booth, Aivazian, Demigue Kunt and Maksimovic, said tax rate, business risk, asset
tangibility, size, profitability and market to book ratio as a determinant of capital structure (Booth et al., 2001). They found the ratio of long-term debt reduced by high tax rates, size, and profitability, but increases with asset tangibility. Hypothesis Formulation, they are:

**H1**: There is the influence of Short Term Debt to the ROE in companies incorporated in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period.

**H2**: There is the influence of Short Term Debt to the ROE in companies incorporated in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period.

**H3**: There is the influence of Short Term Debt and Long Term Debt simultaneously on ROE on an incorporated company registered in the Mining Industry in Indonesia Stock Exchange in 2003-2007 period.

**METHODS**

This research refers to research conducted earlier by Abor (2005), research methods used are statistical testing by using multiple regression (linear regression). Regression analysis is one statistical tool that is used when the dependent and independent variables in the form of metric (interval or ratio). The operational definition of variables: 1) Short-term debt, is a measure of the amount of obligations that must be met by the company, where the age of liability is at most a tender (Jusup 2002). Long term debt, is a measure of the amount of obligations that must be met by the company, where the age of obligation more than one year (Jusup 2002). Profitability by Pao et.al (2003) also known as Return On Equity (ROE) is to measure the overall effectiveness of the company in generating profits by using the equity they have. Population and Sample. Sampling method used in this study was purposive sampling is sampling based on the considerations which a selected sample of companies included in the Mining Industry are listed in Indonesia Stock Exchange in 2003-2007 period.

**RESULTS AND DISCUSSION**

Hypothesis test (t - test). From simple linear regression model above, the result is to prove whether the independent variables individually have an influence on the dependent variable. Then do the test t. In this t test is basically to test the hypothesis that stated as follows:

1. **H0:** $\beta_1 = 0$ ◦ no significant effect between the independent variable (X) individually against the dependent variable (Y).
2. **H1:** $\beta_1 \neq 0$ ◦ there are significant effect between the independent variable (X) individually against the dependent variable (Y).
3. Significance level ($\alpha$) = 0.05. If $t_{\text{count}} > t_{\text{table}}$ ◦ $H_0$ rejected and $H_1$ accepted, meaning that the independent variables individually have an influence on the dependent variable. If $t_{\text{count}} < t_{\text{table}}$ ◦ $H_0$ is accepted and $H_1$ is rejected, meaning that the independent variables individually have no effect on the dependent variable.
F. Test From multiple linear regression model, to prove whether the independent variables simultaneously influence the dependent variable, test F. In this F test can be expressed by the formula:

1. **H0:** $\beta_1 = 0$ <> no significant effect between the independent variable (X) simultaneously to the dependent variable (Y).
2. **Ha:** $\beta_1 \neq 0$ <> there are significant effect between the independent variable (X) simultaneously to the dependent variable (Y).

Significance level ($\alpha$) = 0.05 If $F_{\text{count}} > F_{\text{table}}$ H0 rejected and Ha accepted, meaning that the independent variables simultaneously influence the dependent variable.

If $F_{\text{count}} < F_{\text{table}}$ H0 is accepted and Ha is rejected, meaning that the independent variables do not simultaneously have an influence on the dependent variable. From the multiple regression model was calculated multiple correlation coefficient to determine the relationship between the dependent variable (Y) with independent variables (X1 and X2). To prove the degree of influence of independent variables on the dependent variable used F test. Furthermore, to analyze the relationship between the dependent variable and independent variables that influence it, then made a linear regression equation with the following models.

$$\hat{Y} = a + bX_1 + bX_2 + \varepsilon$$

*Where:

- $Y$ = *Return On Equity*
- $X_1$ = *Short Term Debt*
- $X_2$ = *Long Term Debt*
- $a$ = *interception point*
- $b$ = *regression coefficient*
- $\varepsilon$ = *error*

The coefficient of determination (R2). The coefficient of determination (R2) measures the goodness of fit (goodness of fit) of the regression equation which gives the proportion or percentage of the total variation in the dependent variable, which is explained by the independent variable (Gujarati, 1995). Regression coefficient value lies between 0 and 1. The $R^2 = 1$, meaning that the regression line going to explain 100% of the variation in the dependent variable, if $R^2 = 0$ means that the model that occurred could not explain the regression line at all that happened. It can be concluded that whether a model is not good is determined by the $R^2$ is high, but should pay more attention to logical or theoretical relevance of independent variables with the dependent variable and statistical significance (Gujarati, 2003). Overview of Respondents. The following are brief profiles of companies that are included into the mining industry and has gone public and listed on the Indonesia Stock Exchange of  2003-2007.
Table 1: Object Mining Industry Indonesia Stock Exchange Year 2003-2007

<table>
<thead>
<tr>
<th>Company</th>
<th>Listing at BEJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT. Aneka Tambang Tbk</td>
<td>27 November 1997</td>
</tr>
<tr>
<td>PT. Apexindo Pratama Duta Tbk</td>
<td>10 July 2002</td>
</tr>
<tr>
<td>PT. Bumi Resources Tbk</td>
<td>30 July 1990</td>
</tr>
<tr>
<td>PT. Central Korporindo Tbk</td>
<td>21 November 2001</td>
</tr>
<tr>
<td>PT. Citatah Industri Marmer Tbk</td>
<td>03 July 1996</td>
</tr>
<tr>
<td>PT. Energi Mega Persada Tbk</td>
<td>07 June 2003</td>
</tr>
<tr>
<td>PT. Internasional Nickel Indonesia Tbk</td>
<td>16 March 1990</td>
</tr>
<tr>
<td>PT. Medco Internasional Tbk</td>
<td>12 October 1994</td>
</tr>
<tr>
<td>PT. Perusahaan Gas Negara Tbk</td>
<td>15 December 2003</td>
</tr>
<tr>
<td>PT. Tambang Batubara Bukit Asam Tbk</td>
<td>23 December 2002</td>
</tr>
<tr>
<td>PT. Timah Tbk</td>
<td>19 October 1995</td>
</tr>
</tbody>
</table>

Multi co-linearity test. This analysis is intended to identify independent variables that one should not have a strong or highly correlated relationship with the other independent variables in a model (Santoso, 2001). When the test results with VIF showed that each independent variable has a tolerance value less than 0.10 and VIF value is greater than 10, then the variable is eliminated so that all independent variables can be used for further research. Here are the results Multi co-linearity before the process of elimination.

Based on the results of processing the data using SPSS, regression equation from the analysis of the relationship Short Term Debt & Long Term Debt of Return On Equity can be written as follows:

\[ Y = 0.561 + 2.033X_1 - 1.534X_2 \]

Classic assumption test results conducted on the regression model showed that the regression model has complied with all the classical assumptions, so the equation is stated in compliance with the assumptions BLUE. Explanation of the above regression model can be described as follows:

Constants obtained at 0.561, this shows if all independent variables is zero, then the Return On Equity will of 0.561.

Regression coefficient obtained from the Short Term Debt is 2.033, this shows if the Short Term Debt rose by 1% with the assumption that other variables fixed value, then the Return On Equity will increase by 2.033. Short Term Debt Due to a positive value then any increase in Short Term Debt will be followed by the increase in return on equity amounted to 2.033.

Regression coefficient obtained from the Long Term Debt of 1.534. It shows when the Long Term Debt rose by 1% with the assumption that other variables fixed value, then the return on equity will decrease by 1.534. Because of Long Term Debt has a negative value then any increase in Long Term Debt will be followed by a decline in return on equity is 1.534.

Testing of individual Short Term Debt to Return On Equity is known that the t value obtained 4.357 bigger than t tables at the level of significant 5% (\( \alpha = 0.05 \)) with a degree of freedom (df) = 53, ie 1.6449. This indicates that the effect of changes in Short Term Debt to Return On Equity is the
population being significant. Testing of individual Long Term Debt of Return On Equity, it is known that the t value obtained 5.845 greater than t tables at the level of significant 5% ($\alpha = 0.05$) with a degree of freedom (df) = 53, ie 1, 6449. This indicates that the effect of changes in Long Term Debt of Return On Equity is the population being significant. Based on test results in Table 6 above, shows that the values obtained simultaneously F test, which is equal to 24.2 and this value is greater than the value of F table for the denominator df 52 (55-2-1) and numerator df 2, that is equal to 3.19. Because the calculated F value is greater than the F table, it can be concluded that the variable of Short Term Debt and Long Term Debt jointly have a significant effect on Return On Equity. The coefficient of determination (R2).

the value of determination coefficient of 0.482. This indicates that the independent variable (Short Term Debt and Long Term Debt) can explain the variation changes the dependent variable (Return On Equity) of 48.20%, while the remaining amount of 51.80% is explained by other variables outside of the variables used in research this. Test Result Variable Dominant. Tests on the dominant influence of independent variables on the dependent variable. values obtained standardized beta coefficients of 0.437 Short Term Debt and Long Term Debt of -0.586. Long Term Debt Due to the variable having the largest value of standardized beta coefficients, then the Long Term Debt has the most dominant influence on the Return On Equity.

CONCLUSION

Results of individual regression test showed that (a) Short-term debt has a positive and significant influence on the Return On Equity, (b) Long Term Debt has a negative and significant effect on Return On Equity. Simultaneous regression test results showed that the Short Term Debt and Long Term Debt has a significant effect on Return On Equity. Long Term Debt is the most dominant variable influencing Return On Equity.

There is significant debt Short term, Long Term Debt of Return On Equity, this indicates that the return on equity is affected by the two variables. Companies must pay attention to short term debt, because it will be very influential in the equity cycle, Long Term Debt of the higher will result in the company will have difficulty in paying its obligations to suppliers and vice versa. This study is limited to the mining industry to go public so that the results of this study can not reflect the overall industry conditions. Because it is expected to further research not only focuses on the mining industry but all kinds of industries that went public. For further research is expected to review the consistency of these findings to develop research methodology, variables, and measurement variables.

REFERENCES


Booth, David E., Isenhour, Thomas L. 2001. *On Robust Partial Discriminant Analysis As Decision Making Tool with Clinical and Analytical Chemical Data*, *Computers and Biomedical Research*; 19, p.1-12,


Intentionally Blank