THE ROLE OF DISCOUNTED ESTIMATED CASH FLOW AND FINANCIAL RATIO TO PROBABILITY OF FINANCIAL DISTRESS

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Abstract

I investigate the role of discounted estimated cash flow to probability of financial distress. I also examine the relation influence of several financial ratios to the financial distress. Size and firm risk used as control variable in the logit regression model.

I use negative operating profit during the two years continuously as an indication of the financial distress. The study used 142 companies on the Indonesian Capital Market in year 2001 – 2005, where 45 companies classified as financial distress and the remaining are healthy. The previous researches have proven the hypothesis that financial ratios could predict financial distress. To the extent of the previous research this research involves DCF as a discounted estimated cash flow from operation, as a predictor of financial difficulties condition, together with the other financial ratios as independent variables for the logistic regression model. The estimated cash flows from operation is also positioned as a proxy of a management commitment against owner, especially for companies which categorized financial distress, in the way to be survived for both interest and keep growing its business in the coming years. Therefore this study also reverted to the agency theory. The result of the research reveal that DCF that estimated from operating cash flows, working capital liquidity, and performance that measured by Tobin’s Q could predict the probability of financial difficulties, which fulfill the substance of the study.

Keywords: Financial Distress, Agency Theory, Financial Ratios, DCF Method Estimated Cash Flows from Operations.

Introduction

Financial distress is a situation where the company's operating cash flow is not sufficient to cover the needs current liabilities, and will force the owners to do the actions to save the business. Companies can be brought into the condition of financial distress because of economic pressure resulting from a decrease in the occurrence of the industry, or because of poor management (Wruck 1990). The companies that have been managed well but have financial difficulties because of economic declined, will be more easily improved their performance through management actions. Jensen (1989) states that financial distress will be forced to apply management actions to achieve efficiency improvements that the company's performance. Whiteaker (1999) states that most of companies have financial difficulty as a result of weak management of the company compared with as a result of economic decline.
Sekar (2006) used criteria of financial distressed based on study conducted by Hofer (1980) and Whitaker (1999). Financial distressed is a condition where the company experienced a negative net income for several years. Platt and Platt (2002) defined financial distressed as the decline in financial condition that occurred prior to the occurrence of bankruptcy or liquidation.

Management can recover the companies that have financial difficulty by manage their cash flow and rescheduled their liabilities. Firm value can be measured by discounted estimate of operating cash flow because the operating cash flow is a result of the whole management of future actions. Prospective investors or others who want to take over of a company or corporation is very concerned to know the firm value of companies. To know company's ability to maintain the going concern, particularly the creditors will assess the prospect and strategic planning that will be executed, and the assumptions to prepare cash flow projections.

Researches relating to the financial distress generally use financial ratios as a predictive variable. Financial ratio used by Platt and Platt (2002) is a ratio derived from the financial information in the Balance Sheet and Profit Loss Report. Researches on the condition of the company's financial difficulties rarely use cash flow as a predictive variable.

This study aims to prove that the estimation of operating cash flow as a result of the company's value recovery action have negative effect on the probability of financial distress. In addition, this study will use some of the financial ratio and control variables.

**Previous studies**

A firm is in financial distress at a given point in time when liquid assets of the firm are not sufficient to meet the current requirement of its hard contract (Teresa A. John 1993). There is a relationship between the costs of financial distress with a composition of liquid assets the company. The financial distress companies provide more liquid asset to cover their obligation. More liquid asset will make the profitability decrease because they invest in cash and short-term investment with a low return. According to research Baskin (1972) of 338 large companies in the USA, 9.6% of assets are invested on cash and marketable securities. This indicates that the management maintains the availability liquid asset to meet short term obligations in order to avoid business risks, costs and interest penalty payment delays and the other hand sacrifice its profitability.

Financial distress is an initial financial indicator before start of a bankruptcy. Platt and Platt (2002) conducted research on automotive companies to predict bankruptcy based on preliminary data that meet the criteria of financial distress. The indicators used as an early bankruptcy warning are negative net operating income in recent years, suspend dividend payments and the restructuring or termination of employment.

Based on the theory of capital structure of Miller and Modigliani (1958) value of the firm that is funded with debt (levered firm) is the same as the value of a company that is not funded with debt (unlevered firm). However, by entering the tax, levered firm will have higher value, because the debt tax shield that can be benefited to the company. Benefit of debt tax shields are exposed to the risk of financial distress. The optimal capital structure
balance the potential benefits of debt and potentially financial distress occur. Optimal capital structure will be the maximum value of return for the company after considering beta, market risk and interest rate.

Stuart C. Gilson (1997) states that companies will be in the financial distress when, the company become high. The condition lead to the threat of potential transactions costs. When companies are in the financial distress so it should be done is to make debt restructuring, so that the company still in the optimal capital structures. One of the efforts that must be done is reduce the amount of the debt, sell assets or issue new shares. While such steps will bring the company to the burden of the high transactions costs such, as the sale of assets to the fire-sale prices, and the incidence of tax on the debt restructuring.

Creditors will receive interest and principal loan repayments compared first when the companies will be liquidated. Shareholders are the last to claim assets of the company (residual claim) compared to the bond holders. Even in loss companies must pay a fixed interest and debt repayments to creditors, while the dividend for shareholders may be suspended until the company obtain an adequate balance for profits distributed as dividends. So the risk of shareholders on the levered firm will be higher than the unlevered.

In the good economic conditions and good performance of the company, using debt will be very beneficial to shareholders. This is because the allocation of profit for the bondholder are fixed, when it was increasing the company's performance, plus the tax shields earned by the company debt. Otherwise if performance of the company decreased, there was a transfer wealth from shareholder to the bondholder. Differences of the risks faced by the levered firm and the unlevered firm, the management should choose the capital structure that will be trusted to provide the highest value of company and provide the highest benefits for shareholders.

Before the restructuring actions of the companies that are in the financial distress, the owners and management need to know the value of the firm at the time. On this research it is assumed the company is in a good economic conditions and the ideal of a perfect market. The ideal condition is not suspected of the occurrence of asymmetry information between agent and principal, capital markets and the labor market is a lack of efficient and other barriers. In such circumstances the company can be assessed the firm value based on the ability of the company to get operating cash flow of the future period.

Value of the firm can be measured using the asset valuation models, discounted cash flow and abnormal earning model (Sondi 2004). Discounted cash flow model use the estimated cash flow that are discounted by company's required rate of return. This model using three alternative measurement of the cash flow, dividend, earnings and free cash flows. However, the difficulty in determining the appropriate discount rate and can cause all parties accepted this model rarely used.

Analysis of financial healthy for the purpose of bankruptcy predicted, attract academics, practitioners and regulators. Government regulators use bankruptcy prediction to estimate the macroeconomic policy. Central banks use the bankruptcy prediction model to monitor
the banking. While the capital market regulator concerned to provide protection to investors and prospective investors in the capital market. Practitioners use the bankruptcy prediction model to estimate the costs of capital. While academic develop the bankruptcy model to test various hypothesis about the financial ratio that lead to bankruptcy.

Early study to predict corporate bankruptcy was conducted by Beaver (1966). He compared the pattern of 29 financial ratios of the companies in a period of five years before the bankruptcy than the healthy companies. According to the Beaver’s conclusions ratio cash flow / total liabilities is a comprehensive predictor of the bankruptcy company. The model shows that the average classification error was of 13% which for type I error (the company that predicted a knock but not in reality the wall) is 22%, while for type II errors (the company that predicted a knock, but in reality does not go bankrupt) is equal to 5%. Bankruptcy predicted models using multivariate models that use more than one financial ratio to predict bankruptcy.

Platt and Platt (2002) used logit regression model with six financial ratios of the company: EBITDA to Sales, Current Assets to Current liabilities, Sales, Net Sales to Fixed Assets, Long Term Debt to Equity, Notes payable to Total Assets, and one-year Cash Flow Growth Rate. Regression results show that the ratio of EBITDA to Sales, Current Assets to Current liabilities and one-year Cash Flow Growth Rate has a negative relationship with the probability of the financial distress. The three other ratios have positive relation with financial distress probability.

Altman (1989) developed a better bankruptcy prediction model and is called the Z-score. The model is \[ Z = (1.2 \times \text{working capital} / \text{total assets}) + (1.4 \times \text{retained earnings} / \text{total assets}) + (3.3 \times \text{EBIT} / \text{total assets}) + (0.6 \times \text{market value equity} / \text{book value of debt}) + (1.0 \times \text{sales/total assets}). \] Original model for the Z-score was developed for manufacturing companies, and later he develop two models called the Z' to non-public companies and Z is used for non-manufacturing companies both public and private companies.

Zeta model was developed by Altman, Haldeman and Narayanan (1977). Financial ratio of the parameters used to predict financial distress is taken from the ratio of financial-ratio as follows: Liquidity ratio - current ratio, solvency ratio - equity / capital and the times interest earned, Profitability - ROA ratio and retained earnings / assets, other Ratio - size (total assets) and the variability of ROA.

Kaplan and Ruback (1995) use discounted cash flow from 51 companies that have high level of leverage (HLTs, highly leverage transactions) as a predicted of market value to EBTDA. They compared the DCF valuation method than multiples. The result shows there were similarities between DCF and multiples to predict the market value.

Gregor Andrade and Steven N. Kaplan (1998) find evidence that highly leveraged companies became distressed. Even if the company declares a profit, a high leverage lead to financial distress. Here the leverage to be triggered than other factors such as low performance. With the high leverage of the company will appear in less healthy compared with other companies within the same industry.
Based on previous research, it can be concluded that financial ratio can be used as a prediction tool of financial distress and the company's bankruptcy. Each research uses different financial ratio but liquidity, profitability, and solvency ratios are the common ratio that can predict financial distress.

Operational activities influence to working capital and have impact to the company's cash flow. When the company was predicted to become bankrupt the condition was due to financial difficulties and must be saved. Management needs to explain the future plan of operations that can be estimated through the company's cash flow. When the management has a good strategic plan and have enough cash flow to save the companies, the potential distress will be decreased. We can measure firm value by discounted operating cash flow estimation. Firm value can be used to measure the ability the company to survive from financial difficulties.

Companies that have problems with profitability, liquidity, and solvability and have poor management will run into financial distress. The ratio of financial and other information from the company basically reflects commitment from management (agent) to the owner (principal) on the performance that must be achieved in order to meet the interest on both sides.

Commitment of management to save the companies will be reflected by the management actions. One of the actions is to maintain positive cash flows for the future operation. Positive future cash flow prediction will reduce the probability of bankruptcy. So, the expected positive future cash value have the negative relation with the probability of financial distress.

Firm value is one of the monitor tools for the agent according to the concept of agency theory. There are two alternatives to measure the company performance, Market Price to Book Value (MPBV) and Discounted Cash Flow Method (DCF). MPBV is using actual market price that can be observed from capital market. Discounted cash flow is using internal market price that is derived from future cash flow. Difference between the two alternatives lie on how to assess the accuracy of determining the present value (current) assets and liabilities on the balance sheet, which is needed in the method MPBV, where the assessment of assets required aggregation market value of each asset in the balance sheet and adjustments over book value in order to get fair value. While DCF only need data from the cash flow In addition to the CFO can be used as an input for the model flow beside dividend.

The increase in sales will increase net income. The asset in both quantity and quality will increase together with increasing of sales. Quality of asset increase by changes in technology and it depend on environment of companies industry. Tobin’s Q with the concept of the market value will calculated by market value divided by fair value of asset. In this research, Tobin’s Q measured by total market value of equity plus book value of liabilities devided by total book value of asset. It is difficult to measure fair value of liabilities dan asset.
Platt and Platt (2002) used logit model to find most important financial ratio to predict financial distress. They found four variables that have negative relation to financial distress, i.e: Ebitda / Sales, Current Assets / Current liabilities, Cash Flow and the growth rate. Fixed Assets / total Assets, Longterm Debt/Equity, Notes Payable / Total asset have a positive relationship to possibility of financial distress.

Financial distress is due to mismatch between the availability of current assets with liabilities. This financial difficulties occurred before the company's bankruptcy. Research about the financial difficulties generally focused on the restructuring of the company (Brown, James and Mooradian, 1992) and changing of management (Gilson, 1989).

Platt and Platt (2002), states that earnings before interest tax, depreciation and amortization (EBITDA) divided by sales had a negative relationship with the potential financial difficulties. This ratio measure the operating efficiency of companies. Increasing this ratio will be a smaller potential of financial difficulties.

The model used business risk ($\beta$) and Size (Log Market Value) as a control variable. Both these variables have been commonly used as a control variable in a similar research. Size and Beta represents the risk assessment method from the external because both of those measurement came from capital market that is determined by external factors.

Logit regression model to predict financial distress can be shown with the following equation:

$$
\text{DISTRES} = \beta_0 + \beta_1 \text{DCFit} + \beta_2 \text{LEVit} + \beta_3 \text{WCAPit} + \beta_4 \text{EFFICENCYit} + \beta_5 \text{GROWTHit} + \beta_6 \text{AdjTOBINit} + \beta_7 \text{LMVit} + \beta_8 \text{BETAit} + \epsilon_{it} \ldots \ldots (2)
$$

- \text{DISTRES} = \text{Financial distress. 0 if the company healthy; 1 if the company have experienced financial difficulties.}
- \text{DCF} = \text{discounted cash flow from operations}
- \text{LEV} = \text{capital structure is calculated by total debt / total equity}
- \text{WCAP} = \text{Liquidity Working Capital is calculated with the net working capital divided by total assets}
- \text{EFFICIENCY} = \text{efficiency is calculated with the sales / total assets}
- \text{GROWTH} = \text{Growth is calculated from changes in company profit / total assets}
- \text{AdjTOBIN} = \text{(market value equity + book value of debt)/ book value of asset}
- \text{LMV} = \text{Log stock market value}
- \text{BETA} = \text{risk}
- \epsilon = \text{Error term}

In the earlier research, to test whether a company due to financial distress, researchers use different criteria. Lau (1987) and Hill et al. (1996) using the criteria of labor restructuring or terminate dividend payments; Asquit, Gertner and Scharfstein (1994) use the interest coverage ratio to define financial difficulties. Whitaker (1999) measure the
financial difficulties based on cash flow that is less than the long-term debt. John, Lang and Netter (1992) defines financial difficulties as a change in stock prices.

The research use dummy variable for financial distress, 1 for helathy companies and 0 for financial distress companies. The companies is defined under financial distress if it had negative net operating profit for 2 consecutive years. (in accordance with the definition used by Hofer (1980) and Whitaker (1999).

DCF is calculated using the formula:

$$\text{DCF}_{ti} = \frac{\sum \text{CF}_{t+1}}{(1 + r)^t}$$

Rate of Return ($r$) is calculated by weighted average cost of capital (WACC). CAPM is used to calculate cost of equity, and loan interest rate is used to calculate cost of debt. To get a reasonable estimate of the value of operating cash flow (CFO), the research used average growth CFO four years before the sampling period. Some studies found that financial distress indication due to several years before the experiencing distress.

Variables that are used in the DCF model calculated using the following ways:
1. Measure the rate of average cash flow growth during the previous four years (1997-2000). The rate is used to estimate cash flow for next five years.
2. Calculate average next five years to get the calculated results of operating cash flow estimates to be the average estimate of operating cash flow a year, that is five years from the sigma divided five (Predicted operating cash flow).
3. Estimation operating cash flow is divided by WACC to get DCF.
4. In this regression model, DCF scaled with Market Value of Equity

**Empirical Results**
Table 1 report discriptive statistic for selected variables using 142 obervation. 142 manufacturing companies were selected as sample from IDX (Indonesian Stock Exchange). There were 154 manufacturing companies listed during period of observation but 12 companies delisted or no longer active. Based on the criteria of company's in financial difficulties (financial distress), there were 97 companies with a healthy condition and 45 companies with financial distress condition.
Table 2 presents the result of estimating model. From this model, it can be seen that the coefficients of independent variables: DCF, LMKER, LMV, BETA, TOBIN statistically significant. The accuracy of the model is 85.4% for non-distress, and 60.4% for the of distress. Overall accuracy level is 76.1%. Nagelkerke Rsquare model has 45%, and Cox & Snell Rsquare 33%, meaning explanation power of independent variables able to explain the non-distress and distress well. Statistics Hosmer and Lemeshow test Test is 16%, it means that the model is good.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Coefficient</th>
<th>Sig</th>
<th>Wald</th>
<th>S. E.</th>
<th>Exp.B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>β₀</td>
<td>11.251</td>
<td>.012</td>
<td>6.265</td>
<td>4.495</td>
</tr>
<tr>
<td>DCF</td>
<td>β₁ (-)</td>
<td>-11.376</td>
<td>.001</td>
<td>10.824</td>
<td>3.458</td>
</tr>
<tr>
<td>LEV</td>
<td>β₂ (+)</td>
<td>.004</td>
<td>.655</td>
<td>.200</td>
<td>.0253</td>
</tr>
<tr>
<td>WCAP</td>
<td>β₃ (-)</td>
<td>-1.655</td>
<td>.043</td>
<td>4.093</td>
<td>.818</td>
</tr>
<tr>
<td>EFFICIENCY</td>
<td>β₄ (-)</td>
<td>-.427</td>
<td>.237</td>
<td>1.400</td>
<td>.361</td>
</tr>
<tr>
<td>GROWTH</td>
<td>β₅ (-)</td>
<td>1.877</td>
<td>.627</td>
<td>.236</td>
<td>3.863</td>
</tr>
<tr>
<td>AdjTOBIN</td>
<td>β₆ (+)</td>
<td>.002</td>
<td>.038</td>
<td>4.292</td>
<td>.001</td>
</tr>
<tr>
<td>LMV</td>
<td>β₇ (+)</td>
<td>-.451</td>
<td>.010</td>
<td>6.632</td>
<td>.175</td>
</tr>
<tr>
<td>BETA</td>
<td>β₈ (+)</td>
<td>.626</td>
<td>.014</td>
<td>6.059</td>
<td>.254</td>
</tr>
</tbody>
</table>

The strength and persistence of the observed relation between DCF and probability of distress indicates that future cash flow will save the companies from financial difficulties. This result consistent with the prediction. Kaplan and Ruback (1995) that conducted research using multiples and discounted cash flow to test the performance of the company.
Leverage that measured by total debt divide by equity, have positive relation to the probability of financial distress. Based on the theory of capital structure the higher the leverage the more likely companies are in financial distress. This result are consistent with Platt and Platt (2002). WCAP that measure by total current assets divide by total debt have negative relation to the financial distress. It means the greater liquidity of the companies will result the small probability financial distress. This results are consistent with research Platt and Platt (2002). In general, companies that have a strong working capital will severe from financial distress.

Efficiency is the comparison between total sales to total assets (total asset turnover). This ratio have positive relation to the probability of distress but not statistically significant. Growth that measured by net income devide by total assets have positive relation to the probability financial distress, but the result not significant. This result opposite the hypothesis. The influence AdjTOBIN'S Q as a proxy of companies performance to the financial distress is positive. AdjTobin Q is significant variable that affecting the probability financial distress. It means the greater performance (Tobin) will reduce the probability of financial distress.

The control variables, Beta and size statistically significant. Beta have positive relation to the probability of financial distress. It means that greater risk of companies will increase the probability of financial distress. But size have negative relation to the probability of financial distress. This result opposite the hypothesis.

Sensitivity test is conducted by changing DCF with price to book value. PBV reflect the external measurement of company value while DCF is internal measurement. Test results are not significant. PBV can not explain the probability of financial distress. The market is not able to detect the existence of financial distress.

Conclusion
Based on the results of hypothesis testing logistic regression models, the discounted cash flow from operations have positive relation to the probability of financial distress. The financial ratio that effect on the probability of financial distress is working capital and AdjTobin's Q. The DCF (discounted Estimated cash flow from operation) and Working Capital have negative effect to the probability financial distress. While the performance of the variable (a proxy with Tobin's Q) have positive effect to the probability of financial distress. The research also concluded the risk factor (beta) and size (log market value) is significant but size has opposite result with the hypothesis.

Ratio obtained from the DCF calculation techniques estimate the average operating cash flow five years discounted with the WACC as the rate of return, not based on the estimated operating cash flow that actually (real) made by the management company and is supported with the assumptions that external and internal or valid in accordance with the operational aspects (marketing, production, engine capacity, human resources and so on) the company concerned. Further studies can use the DCF model that others are: earnings, future dividend, free cash flow, as independent variables.

This research base criteria only on the financial distress that the company had
experienced a negative operating profit during two consecutive years within a period of five years (sampling period 2001-2005), without discriminating whether the loss period of two years were at the beginning of the sampling period (2001 -2002), the sampling period or at the end of the period (2004-2005). In the sense that the company may have to recover from financial difficulties (due to the loss of two years in succession at the beginning of the sampling period) is still classified as financial distress.

Reference

Altman, Edward I.,” Predicting Financial Distress of Companies Revisiting the Z-Score and ZETA* Models


