CHAPTER II

LITERATURE REVIEW

2.1 Financial Ratios Analysis

Financial ratios are important to analysts due to conquer the little meaning of typically numbers. Thus, ratios are intended to provide meaningful relationship between individual values in the financial statement (Reilly, Brown, 2006). Because the major financial statement report numerous individual items, it is possible to produce a vast number of potential ratios, many which will have little value.

A single number from a financial statement is of little use, an individual financial ratio has a little value except in relation to comparable ratios for other entities. That is, only relative financial ratios are relevant. A firm's performance relative can be compared by the aggregate economy; or by its industries; or by its past performance (Reilly, Brown, 2006).

In this thesis, financial ratios used to evaluate company's performance during 2004 – 2008 compared to industry average performance and other competitors.

2.1.1 Liquidity Ratios Analysis

The simple meaning of liquidity is the ability of a firm to pay its bills on time. Liquidity is a way on how a firm can convert its non-cash assets into cash, as well as the size of the firm's investment in non-cash assets relative to its short-term liabilities

(Keown, Martin, Petty, 2008). Regarding to this definition, we understand that there are several ways to calculate company liquidity for current ratio, quick ratio and cash ratio.

Current ratio indicates the firm's degree of liquidity by comparing its current assets to its current liabilities (Keown, Martin, Petty, 2008) and defined as:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liability}}$$

Quick ratio is the more accurate way to measure the liquidity than the current ratio in that it excludes inventories and other current assets, which are least liquid, from current assets (Keown, Martin, Petty, 2008). Refers to White, Sondhi, Fried, (2002) quick ratio is a more conservative way in measuring the liquidity which excludes inventory and prepaid expenses from cash resources, recognizing that the conversion of inventory to cash is less certain both in terms of timing and amount and that prepaid expenses reflect past cash outflows rather than expected inflows. The included assets are 'quick assets' because they can be quickly converted to cash. The ratio defined as:

$$\text{Quick Ratio} = \frac{\text{Cash} + \text{Marketable Securities} + \text{Accounts Receivable}}{\text{Current Liability}}$$

Cash ratio is the most conservative of these measures of cash resources, as only cash and securities easily convertible to cash are used to measure cash resources (White, Sondhi, Fried, 2002).

$$\text{Cash Ratio} = \frac{\text{Cash} + \text{Marketable Securities}}{\text{Current Liability}}$$

Another way to measure the cash flow from operations ratio is by comparing actual cash flows with current liabilities. This ratio avoids the issues of actual convertibility to cash, turnover, and the need for minimum levels of working capital to maintain operations (White, Sondhi, Fried, 2002).

$$\text{Cash Flow from Operations Ratio} = \frac{\text{Cash Flow from Operations}}{\text{Current Liability}}$$

2.1.2 Activity Ratios Analysis

Activity ratios described the relationship between the firm's level of operations (sales) and the assets needed to sustain operating activities. The higher the ratio, the more efficient the firm's operations, as relatively fewer assets are required to maintain a given level of operations (sales). Activity ratios can also be used to forecast a firm's capital requirements (both operating and long-term). Activity ratios enable the analyst to forecast these requirements and to assess the firm's ability to acquire the assets needed to sustain the forecasted growth (White, Sondhi, Fried, 2002).

2.1.2.1 Short-term (operating) activity ratios

Inventory turnover measures the number of times a firm's inventories are sold and replaced during the year, that is, the relative liquidity of the inventories (Keown, Martin, Petty, 2008). A higher ratio indicates that inventory does not remain in warehouse or on the shelves but rather turns over rapidly from the time of acquisition to sale (White, Sondhi, Fried, 2002). The ratio defined as:

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

The inverse of this ratio can be used to calculate the average number of day inventory is held unit it is sold (White, Sondhi, Fried, 2002) as follows:

$$\text{Average No. Days Inventory In Stock} = \frac{365}{\text{Inventory Turnover}}$$

Receivables turnover expresses on how often accounts receivable are 'rolled over' during a year (Keown, Martin, Petty, 2008). The receivable turnover ratios measure the effectiveness of the firm's credit policies and indicate the level of investment in receivable needed to maintain the firm's sales level (White, Sondhi, Fried, 2002). The ratio defined as:

$$\text{Receivable Turnover} = \frac{\text{Sales}}{\text{Average Trade Receivable}}$$

And

$$\text{Average No. Days Receivable Outstanding} = \frac{365}{\text{Receivable Turnover}}$$

The accounts payable turnover ratio and number of days payable are outstanding can be computed as follows:

$$\text{Payables Turnover} = \frac{\text{Purchases}}{\text{Average Account Payables}}$$

$$\text{Average No. Days Payables Outstanding} = \frac{365}{\text{Payables Turnover}}$$

$$\text{Purchases} = \text{COGS} + \text{changes in inventory}$$

Recently the accounts payable trend is significant as they represent an important source of financing for operating activities. The time spread between when the company must paid to their suppliers and when it received payment from customers is critical for wholesale and retail industry with large inventory balances.

2.1.2.2 Long-term (investment) activity ratios

Fixed asset turnover is a firm's sales divided by its net fixed assets, to measure the efficiency of long-term capital investment (White, Sondhi, Fried, 2002). If the company ratio is below the industry average, it indicates that the company is not using its fixed assets effectively as any other companies in the industry.

$$\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Average Fixed Assets}}$$

Total asset turnover is a firm's sales divided by its total assets and as an overall activity measure relating sales to total assets. If the company ratio is below the industry average, it indicates that the company is not generating a sufficient volume of business given its total asset investment. Sales should be increased, some assets should be disposed of, or a combination of these steps should be taken (Brigham, Gapenski, 1997). The ratio defined as:

$$\text{Total Asset Turnover} = \frac{\text{Sales}}{\text{Average Total Assets}}$$

2.1.3 Long-term Debt and Solvency Analysis

Long-term debt and solvency ratios answer the question about how the company finances its assets. This ratio essentially evaluates its long-term risk and return prospects. Leveraged firms accrued excess returns to shareholders as long as the rate of return on the investments financed by debt is greater than the cost of debt. The benefits of financial leverage is, however, if demand or profit margins decline in the form of fixed costs would affect the profitability of the company (White, Sondhi, Fried, 2002). The ratio defined as:

$$\text{Debt to Total Capital} = \frac{\text{Total Debt(Current} + \text{Long} - \text{Term)}}{\text{Total Capital(Debt} + \text{Equity)}}$$

Or

$$\text{Debt to Equity} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

Debt-to-equity ratios examine the company's capital structure and indirectly, its ability to meet current debt obligations. There is a more direct measure of the company's ability to meet interest payment from its annual operating earnings is (White, Sondhi, Fried, 2002)

$$\text{Times Interest Earned} = \frac{\text{EBIT}}{\text{Interest Expense}}$$

This ratio measures the extent to which operating income can be decline before the company is unable to meet its annual interest costs. If this is obeyed, can bring legal action by the company's creditors, possibly resulting in bankruptcy. If times interest earned is below the industry average, it indicates the company uses significantly more debt than the average company in the industry, which leads to more interest expense. And second, its operating return on assets is slightly less than other companies, which means it has less operating income to cover the interest. In the future the company would face difficulties if they needed another new loan from the creditors.

2.1.1 Profitability Ratios Analysis

Profitability ratios answers question about are the company's managers generating adequate operating profits on the company's assets. This is a frequently asked question by shareholders; because one of the most important ways managers

creates shareholder value is to earn strong profits on the assets in which they have invested.

2.1.2.1 Return on Sales

One measure of profitability is the relationship between the company's cost and its sales. The ability to control costs in relation to revenue enhances earnings power. The ratio describe as follows:

Gross margin captures the relationship between sales and manufacturing costs and defined as (White, Sondhi, Fried, 2002):

$$\text{Gross Margin} = \frac{\text{Gross Profit}}{\text{Sales}}$$

Operating margin measures how good a company is managing its cost of operations, in terms of both the cost of goods sold and operating expenses such as sales and marketing expenses, administrative and general expenses, and depreciation expenses relative to the company's revenue. If the operating margin is below the industry average, it indicates the company's manager did not well managed in cost of goods sold and operating expenses compare to other firms. Or in other word, the company has higher costs per sales dollar, which result in a lower operating profit margin. This ratio defined as (Keown, Martin, Petty, 2008):

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Sales}}$$

The overall profit margin is net of all expenses, is calculated by dividing net income by sales and it gives the profit per dollar of sales. If the profit margin ratio is below the industry average, it indicates that the company's sales are too low, or its costs are too high, or both (Brigham, Gapenski, 1997). The formula for the ratio would be:

$$\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Sales}}$$

2.1.2.2 Return on Investment

Return on investment measures the relationship between profits and the investment required to generate them. There is several measurement of ROI such as return on assets compares income with total assets. Return on assets can be computed on a pretax basis using EBIT (Earning Before Interests and Taxes) as the return measure. This result in a ROI measure that is unaffected by differences in a company's tax position as well as financial policy (White, Sondhi, Fried, 2002):

$$\text{Return On Assets (ROA)} = \frac{\text{EBIT}}{\text{Average Total Assets}}$$

Return on equity ratio answers whether the company is providing a good return on the capital provided by the company's shareholders. This ratio is the accounting rate of return earned on the common stockholders' investment and defined as (White, Sondhi, Fried, 2002):

$$\text{Return On Equity (ROE)} = \frac{\text{Net Income}}{\text{Average Stockholders' Equity}}$$

A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio.

The return on investment formula:

$$\text{ROI} = \frac{\text{(Gain from Investment - Cost of Investment)}}{\text{Cost of Investment}}$$

Return on investment is a very popular metric because it is flexible and simple. Hence, if an investment does not have a positive ROI, or if there are other opportunities with a higher ROI, then the investment should be not be undertaken.

2.2 Valuation

2.2.1 Valuation Approaches

There are several models generally used by analysts in valuing an asset. Each model can provide significant differences in outcomes depend on fundamental errors in valuators' logic. There are three valuationapproaches (Damodaran, 2002):

- Discounted Cash Flow (DCF) valuation, which relates the value of an asset to the present value (PV) of expected future cash flow on that asset.

- Relative valuation, which estimates the value of an asset by looking at the pricing of comparable assets relative to a common variable such as earnings, cash flows, book value, or sales.
- Contingent claim valuation (real option), which uses option-pricing models to measure the asset value that share option characteristics.

Both of these approaches have several common factors, first, all valuation approaches significantly affected by the investor's required rate of return on the stock and second, affected by estimated growth rate of the variable used in the valuation technique.

2.2.2 Discounted Cash Flow Valuation

Discounted Cash Flow Valuation (DCF) has its foundation in the present value rule, where the value of any asset is the present value of expected future cash flow on it (Damodaran, 2002).

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

where n = Life of the asset
CF_t = Cash flow in period t
r = Discount rate reflecting the riskiness of the estimated cash flows

The cash flows will vary from asset to asset and the discount rate will be a function of the riskiness of the estimated cash flows, with higher rates for riskier assets and lower rates for safer projects. In DCF valuation, the investor tried to estimate the intrinsic value of an asset based on it fundamental. Intrinsic value of an

asset is the amount an investor should be willing to pay for the asset given the amount, timing and riskiness of its future cash flows (Keown, Martin, Petty, 2008). If the intrinsic value is greater than the market value, then the security or stock is undervalued in the eyes of the investor. Should the market value exceed the investor's intrinsic value, then the security or stock is overvalued.

There are three paths to discounted cash flow valuation, first is to value just the equity stake in the business. Second is to value the entire firm, which includes, besides equity, the other claimholders in the firm such as bondholders, preferred stockholders). Third is to value the firm in pieces, beginning with its operations and adding the effects on value of debt and other non-equity claims.

The value of equity is obtained by discounting expected cash flows to equity at the cost of equity. The formula defined as (Damodaran, 2002):

$$\text{Value to equity} = \sum_{t=1}^{t=n} \frac{\text{CF to equity}_t}{(1+k_e)^t}$$

Where: n = Life of the asset
CF to equity_t = Expected cash flow to equity in period t
k_e = Cost of equity

The dividend discount model (DDM) is defined as the value of equity of the present value of expected future dividends. The dividend discount model is the easiest way to measure of a cash flow, because the cash flows go directly to the investor. However, this technique is not recommended applied to firms with low dividends payments during high growth periods, or whenever the firm has high rate of return

investment alternatives available. On the other hand, the advantage is that the reduced form of the DDM is very useful when discussing valuation for a stable, mature entity where the assumption of relatively constant growth for the long-term is appropriate (Reilly, Brown, 2006).

The value of the firm is measured by discounting expected cash flows to the firm at the weighted average cost of capital (WACC), which is the cost of the different components of financing used by the firm, weighted by the market value proportions. The formula defined as (Damodaran, 2002):

$$\text{Value of firm} = \sum_{t=1}^{t=n} \frac{\text{CF to firm}_t}{(1+\text{WACC})^t}$$

Where: n = Life of the asset
CF t firm_t = Expected cash flow to firm in period t
WACC = Weighted Average Cost of Capital

This is a very useful model when comparing firms with diverse capital structures because the investor determine the value of the total firm and then subtract the value of the firm's debt obligations to arrive at a value for the firm's equity (Reilly, Brown, 2006).

To support that argument, the author took the additional journal as backup theoretical review taken from 'Value and Worth: Scenario Analysis' (Nick French, 2006). In the journals, authors went on to consider the investment method, implicit, and explicit, as an appropriate model for the valuation of a rack-rented office building

in the United Kingdom. By the research, the discounted cash flow (DCF) method produces the same value as the traditional method. As a pricing model, either can be used, however the advantage of the DCF model is that it makes the assumptions underpinning the valuation explicit.

The valuation is a single figure based upon predetermined input information. In this case, the estimator has determined the appropriate all risk yields, the equated yield, the implied rental/capital growth and so on. A calculation of worth is a separate analysis that tests the assumptions underpinning the valuation. If the investor believes that the market is underestimating the expected growth of rental in the market, then the calculation of worth analysis can change the growth input to calculate the worth of the investment based on that new assumption.

Another journal to support the statement about DCF as the most useful model was 'Estimating Free Cash Flows and Valuing a Growth Company' by Beneda (2003). In this journal, author compared between two valuation models: Dividend Discount Model (DDM) and corporate valuation model (DCF) and conclude that DCF was suitable method in valuing growth company. It is because:

- DCF separates operating performance from non-operating performance.
- Corporation's value depends on the cash flows from many different assets, and on the actions of many managers, while DDM would not be much use in valuing divisions and projects, since divisions and projects do not pay dividends.

- DCF is designed to allow significant changes in debt, typical for growth companies.
- Others useful information in valuing a company, such as Return on Invested Capital (ROIC), and Economic Value Added (EVA) can be determined by using information generated by DCF model.
- DCF can be used to evaluate the effects of alternative strategies on a firm's value (value-based management system) (Brigham and Davies, 2002), which is also useful for projecting future financing needs, especially for companies whose needs are changing.
- Other aspect of value-based management system is its use in corporate governance. The corporate valuation models (DCF) show how corporate decisions effect stockholders.

The value of the firm can also be obtained by valuing each claim on the firm separately. This approach is called adjusted present value (APV) and begins by valuing equity in the firm, assuming that is was financed only with equity. And then consider the value added (or taken away) by debt by considering the present value (PV) of tax benefits that flow from debt and the expected bankruptcy costs.

The formula defined as (Damodaran, 2002):

Value of firm = Value of all equity financed firm + PV of tax benefits + Expected bankruptcy costs

2.2.2.1 Free Cash Flow to Equity

To estimate how much cash a firm can afford to return to its stockholders, free cash flow to equity will begin with the net income and convert it to a cash flow by subtracting out a firm's reinvestment needs (Damodaran, 2002).

First, any capital expenditures, defined commonly include acquisitions, are subtracted from the net income, since they represent cash outflows. Depreciation and amortization, on the other hand, are added back in because they are non-cash charges. The difference between capital expenditures and depreciation (net capital expenditures) is usually a function of the growth characteristics of the firm.

Second, the formula then is subtracted by changes in non-cash working capital since increases in working capital drain a firm's cash flows, while decreases in working capital increase the cash flows available to equity investors. Firms that are growing fast, in industries with high working capital requirements, typically have large increases in working capital.

Finally, equity investors also have to consider the effect of changes in the levels of debt on their cash flows. Repaying the principal on existing debt represents a cash outflow, but the debt repayment may be fully or partially financed by the issue of new debt, which is a cash inflow. Again, netting the repayment of old debt against the new debt issues provides a measure of the cash flow effects of changes in debt. The formula of Free Cash Flow to Equity (FCFE) is computed as (Damodaran, 2002):

Free cash flow to equity = Net income – (Capital Expenditures – Depreciation) – Changes in noncash working capital + (New debt issued – Debt repayments)

2.2.2.2 Free Cash Flow to the Firm

The Free Cash Flow to the Firm (FCFF) is the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders, and preferred stockholders. There are two ways of measuring the free cash flow to the firm.

One is to add up the cash flows to the claim holders, which would include cash flows to equity (defined either as free cash flow equity or dividends),cash flows to lenders (which would include principal payments, interest expenses, and new debt issues), and cash flows to preferred stockholders (usually preferred dividends) (Damodaran, 2002):

FCFF = Free Cash Flows to Equity + Interest expense(1-Tax Rate)+ Principal repayments – New debt issues + Preferred Dividends

Second, free cash flow to the firm is to estimate the cash flows prior to any of those claims. Thus we could begin with the earnings before interest and taxes, net out taxes and reinvestment needs, and arrive at an estimate of the free cash flow to the firm (Damodaran, 2002):

FCFF = EBIT(1-Tax rate) + Depreciation – Capital expenditure – Δ Working capital

Since this cash flow is prior to debt payments, it is often referred to as an un-levered cash flow. This free cash flow to the firm does not incorporate any of the tax benefits due to interest payments, because the use of the after tax cost of debt in the cost of capital already considers this benefit.

2.2.2.3 Terminal Value

Since the investor cannot estimate cash flows forever, they generally impose closure in discounted cash flow valuation by stopping their estimation of cash flows sometime in the future and then computing a terminal value that reflects the value of firm at that point (Damodaran, 2002):

$$\text{Value of firm} = \sum_{t=1}^{t=n} \frac{\text{CF to firm}_t}{(1+\text{WACC})^t} + \frac{\text{Terminal Value}_n}{(1+\text{WACC})^n}$$

The investor can find the terminal value in one of three ways. One is to assume a liquidation of the firm's assets in the terminal year and estimate what others would pay for the assets that the firm has accumulated at that point. The other two approaches value the firm as a going concern at the time of the terminal value estimates, first, applied a multiple to earnings, revenues, or book value to estimate the value, and second, assumes that the cash flows of the firm will grow at constant rate forever – a stable growth rate. With stable growth, the terminal value can be estimated using a perpetual growth model.

In the stable growth model, the investor assumes that cash flows, beyond the terminal year, will grow at a constant rate forever. The terminal value computed as follows (Damodaran, 2002):

$$\text{Terminal Value}_t = \frac{\text{Cash Flow}_{t+1}}{\text{r} - \text{Stable growth}}$$

The cash flow and the discount rate used will depend on whether we are valuing the firm or valuing equity. If the investor valuing equity, the terminal value of equity computed as (Damodaran, 2002):

$$\text{Terminal Value}_n = \frac{\text{Cash Flow to equity}_{n+1}}{\text{Cost of equity}_{n+1} - g_n}$$

The cash flow to equity can be defined strictly as dividends (in the DDM model) or as free cash flow to equity. If valuing a firm, the terminal valuecomputed as (Damodaran, 2002):

$$\text{Terminal Value}_n = \frac{\text{Free cash flow to firm}_{n+1}}{\text{Cost of capital}_{n+1} - g_n}$$

Where the cost of capital and the growth rate in the model are sustainable forever. The fact that a stable growth rate is constant forever, however, puts strong constraints on how high it can be. Since no firm can grow forever at a rate higher than the growth rate of the economy in which it operates, the constant growth rate cannot be greater than the overall growth rate of the economy. In making a judgment on what

the limits on stable growth rate are, investor has to consider the following three questions (Damodaran, 2002):

1. Is the company constrained to operate a domestic company, or does it operate (or have the capacity to operate) multinational? If a firm is purely domestic company, either because of internal constraints or external, the growth rate in the domestic economy will be the limiting value. If the company is a multinational, the growth rate in the global economy will be the limiting value.
2. Is the valuation being done in nominal or real terms? If the valuation is a nominal valuation, the stable growth rate should also be a nominal growth rate. If the valuation is a real valuation, the stable growth will be constrained to be lower.
3. What currency is being used to estimate cash flows and discount rates in the valuation? The limit on stable growth will vary depending on what currency is used in the valuation. If a high-inflation currency is used to estimate cash flows and discount rates, the stable growth rate will be much higher, since the expected inflation rate is added on to the real growth. If a low-inflation currency is used to estimate cash flows, the stable growth rate will be much lower.

2.2.2.4 Weighted Average Cost of Capital

To value a company using DCF approach, the investor discount free cash flow by the weighted average cost of capital (WACC). The WACC represents the opportunity cost that investors face for investing their funds in one particular business instead of others with similar risks (Reilly, Brown, 2006).

The most important principle underlying successful implementation of the cost of capital is consistency between the components of WACC and free cash flow. To assure consistency, the cost of capital must meet several criteria (Reilly, Brown, 2006) as follows:

- It must include the opportunity costs from all sources of capital – debt, equity, and so on – since free cash flow is available to all investors, who expect compensation for the risks they take.
- It must weighed each security's required return by its target market-based weight, not by its historical book value.
- It must be computed after corporate taxes (since free cash flow is calculated in after-tax terms).
- It must be denominated in the same currency as free cash flow.
- It must be denominated in nominal terms when cash flows are stated in nominal terms.

In its simplest form, the weighted average cost of capital is the market-based weighted average of the after-tax cost of debt and cost of equity (Reilly, Brown, 2006):

$$WACC = D/V\ k_d\ (1-T_m) + E/V\ k_e$$

Where:

D/V = Target level of debt to enterprise value using market-based values
E/V = Target level of equity to enterprise value using market-based values
k_d = Cost of debt
k_e = Cost of equity
T_m = Company's marginal income tax rate

2.2.2.5 Cost of Equity

To determine the cost of equity, the investor rely on the capital asset pricing model (CAPM), one of many theoretical models that convert a stock's risk into expected return. The CAPM uses three variables to determine a stock's expected return: the risk-free rate, the market risk premium (i.e. the expected return of the market over the risk-free bonds) and the stock's beta (Reilly, Brown, 2006). In the CAPM, the risk-free rate and market risk premium are commonly used to all companies, only beta varies across companies. The formula can defined as:

$$k_c = k_{rf} + \beta\ (k_m - k_{rf})$$

where:

k_{rf} = the risk-free rate

β = the systematic risk of the common stock's returns to the market as a whole, or the stock's beta coefficient

$k_m - k_{rf}$ = the market-risk premium, which equal to the difference in the expected rate of return for the market as a whole, that is, the expected rate of return for the "average security" minus the risk free rate

Cost of common equity is more difficult to estimate than the cost of debt or cost of preferred stock because the common stockholder's required rate of return is not observable. Common stockholders are the residual owners of the firm, which means that their return is equal to what is left of the firm's earnings after paying the firm's bondholders their contractually set interest and principal payments and the preferred stockholders their promised dividends. Common equity also can be obtained either from retention of firm earnings or through the sale of new shares (Keown et al., 2008).

Other method for estimating the common stockholder's required rate of return (Keown et al., 2008) was Dividend growth model. Base on this model, value of firm's common stock is equal to the present value of all future dividends. When dividends are expected to grow at a rate g forever, and g is less than the investor's required rate of return, k_{cs}, then the value of common stock, P_{cs}, can be written as:

$$P_{cs} = \frac{D_1}{k_{cs} - g}$$

Where D_1 is the dividend expected to be received by the firm's common shareholders 1 year hence. The investor's required rate of return then is found by solving the equation:

$$k_{cs} = \frac{D_1}{P_{cs}} + g$$

2.2.2.6 Beta

According to the CAPM, a stock's expected return is driven by beta, which measures how much the stock and market move together. In the market model, the stock's return (not price) is regressed against the market's return (Reilly, Brown, 2006).

There are three approaches available for estimating these parameters: one is to use historical data on market prices for individual investments; the second is to estimate the betas from the fundamental characteristics of the investments; and the third is to use accounting data (Damodaran, 2002).

To estimated beta using historical data should use at least 60 data points, based on monthly returns – if using shorter return periods, such as daily and weekly returns, leads to systematic biases; company stock returns should be regressed against a value-weighted, well-diversified portfolio (Reilly, Brown, 2006).

Beta represents the overall risk of a company as it relates to investing in a large market. Each public company has a beta. The stock market as a whole is assigned a beta of 1.0. Betas measure the volatility of the excess return on those individual securities relative to that of the market as a whole. Securities with beta more than 1.0 are considered more risky and those with betas of less than 1.0 are more conservative investments with systematic risks lower than the market.

Furthermore, a portfolio that has beta of 5.0 will tend to participate in broad market moves, but only half as much as the market overall. A portfolio with a beta of 2.0 will tend to benefit or suffer from broad market moves twice as much as the market overall (Hitchner, 2006).

The formula for beta can be expressed as follows (Hitchner, 2006):

$$\beta = \frac{COV(R_s\ R_m)}{VAR(R_m)}$$

Where:

β	=	Subject company's beta coefficient
COV	=	Covariance of returns between the subject company (R_s) and the market (R_m)
VAR	=	Variance of the returns on the market

The covariance measures the strength of the linear relationship between two numerical variables (X and Y) (Levine et al., 2008):

$$COV(X,Y) = \frac{\sum_{i=1}^{n}(X_i - \overline{X})(Y_i - \overline{Y})}{n-1}$$

The sample variance is the sum of the squared differences around the mean divided by the sample size minus one (Levine et al., 2008):

$$S^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}$$

Where:

$\overline{X}$	=	mean
n	=	sample size
X_i	=	value of the variable X

2.2.2.7 Cost of Debt

The cost of debt measures the current cost to the firm of borrowing funds to finance projects. In general terms, it is determined by the following variables: the risk-less rate, the default risk (and associated default spread) of the company and the tax advantage associated with debt. The formula can define as (Damodaran, 2002):

After-tax cost of debt = Pretax cost of debt (1 – Tax rate)

Actual rate a business entity pays on interest-bearing debt is the pretax cost of debt, assuming the enterprise is borrowing at market rates. When there is long-term debt involved, the rates being paid may differ from the prevailing market, due to changes in required yields on debt of comparable risk because on changes in market influences (Hitchner, 2006).

The simplest scenario for estimating the cost of debt occurs when a firm has long-term bonds outstanding that are widely traded. The market price of the bond in

conjunction with its coupon and maturity can serve to compute a yield that is used as the cost of debt. Many firms have bonds outstanding that do not trade on a regular basis. Since these firms are usually rated, we can estimate their costs of debt by using their ratings and associated default spreads (Hitchner, 2006).