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# DETERMINANTS OF THE COST OF EQUITY OF MALAYSIAN FIRMS

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**Abstract**

A number of Capital Asset Pricing Model (CAPM) and its variants are considered in this paper for exploring the determinants of the cost of equity of Malaysian firms. The semi-deviation approach is shown to yield the highest explanatory power on the returns of firms. The estimates of cost of equity from the semi-deviation approach were regressed on a list of potential determinants in a panel model analysis. The results show that firm size, book-to-market ratio, payout ratio and return to equity are negatively related to the cost of equity.

***Keywords***: CAPM, cost of equity, determinant, firm.

*JEL classification codes*: G12, G31

## 1. Introduction

Cost of equity, or more commonly known as required rate of return, is the minimum return needed to compensate the common stockholders of a firm. Accurate estimation of the cost of equity is vital for making many financial decisions, for example capital structure choice, capital budgeting analysis, performance assessment, and firm valuation. There are various methods in which a firm's cost of equity can be obtained, for example, the discounting cash flow method and the Capital Asset Pricing Model (CAPM), there is no consensus in the literature as to which is the best model. Survey evidence (see for example, Bruner et al., 1998 and McLaney et al., 2004) indicates that although investors use a wide variety of asset pricing model for calculating cost of equity, they favour the CAPM.

In the quest to search for the best asset pricing model for the case of Malaysia, the current paper works with the CAPM since it is most widely applied among practitioners. The choice bears some merits since practitioners are the end users who rely on the model for financial decision making. To begin with, we have the Local CAPM (LCAPM) which is suitable for markets that are segmented. Then, there is the Global CAPM (GCAPM) designed to capture the variation in firm's returns that is explained by global market returns. According to Stulz (1981), GCAPM should be used for markets that are fully integrated, and the cost of equity estimates using LCAPM and GCAPM should be significantly different. However, Mishra and O'Brien (2001), Koedijk et al. (2002), Harriset al. (2003), and Koedijk and van Dijk (2004) seemed to share the view that the local and global asset pricing models, on average, do not produce substantial difference in cost of equity estimates.

Due to the believe that emerging markets lie within the continuum of full integration at one end and full segmentation at the other end, specific adjustments were made to the CAPM in order to better suit an emerging market setting. Some examples include Lessard's (1996) model, Godfrey and Espinosa's (1996) model, Pereiro's (2001) adjusted hybrid CAPM, and Damodaran's (2002) model. The present study identifies a gap in Pereiro's (2006) comprehensive list of asset pricing models for emerging markets in that they do not consider both local and global factors simultaneously. If Malaysia is partially integrated to the world capital market, then a model which considers both local and global factors might offer greater explanatory power on firm’s stock returns. Hence, better cost of equity estimates could be obtained.

To compare the performance of the various models, we applied the commonly used $R^2$ and adjusted $R^2$. After the best model is selected, its cost of equity estimates were then used for exploring the determinants of firm’s cost of equity. The existing literature is lacking of studies that examine determinants of cost of equity. In most studies, exploring for cost of equity determinants is not the core objective, but a peripheral product of the analysis on the impact of different factors such as financial liberalization (Ameer, 2007), liquidity (Lin et al., 2009), earnings forecast (Rakow, 2010), and corporate governance (Chen et al., 2009, Guedhami and Mishra, 2009) on cost of equity. In the present study, potential cost of equity determinants are divided into firm’s fundamental-related factors (debt-to-equity, return-to-equity, sales-to-assets and payout ratio) and price-related factors (firm size, market-to-book, stock liquidity, dividend yield, earnings per share, beta, semi-deviation and standard deviation of returns).

Our empirical results reveal two interesting features. First, we find that downside risk measures are better than their standard risk counterparts, a finding that is in line with Estrada (2000, 2001, 2002). Further, model which considers both local and global risk factors has higher explanatory power than model that considers only either a single risk factor. Second, contrary to the wisdom in the literature on asset pricing, we do not find the book-to-market ratio to be positively related to firm’s cost of equity. Instead, we find the book-to-market and cost of equity are negatively related. Our result seems to support the findings of Dichev (1998) and Zaretzky and Zumwalt (2007) that most distressed firms have low book-to-market ratios. Therefore, firms with low book-to-market ratios should incur higher cost of equity.

The rest of the paper is organized as follows. Section 2 presents the methodology and data. Results and discussions are given in Section 3. Finally, concluding remarks are presented in Section 4.

## 2. Methodology and Data

This section is divided into three parts. The first part discusses the various CAPM variants and two non-CAPM based models for estimating firm’s cost of equity. The second part provides a list of potential cost of equity determinants as well as their expected relationship with firm’s cost of equity. The third part discusses the data used in the study.

### 2.1 Measuring Cost of Equity

Modern financial economics assumes that investors’ risk perception of a firm is reflected in the cost of equity of the firm. Being risk-adverse, investors will demand a higher return when the perceived risk is larger. This transforms into a simple method for computing the firm’s cost of equity by stacking up the risk-free rate and the premium for systematic risk, which is the product of the beta for firm *i* ($\beta_i$) and the benchmark market risk premium, as follows:

Cost of Equity = Risk-Free Rates + (Risk Measure x Market Risk Premium)

or $$CE_i = R_f + \beta_i \left( R_m - R_f \right) \qquad (1)$$

where $CE_i$ represents the cost of equity for firm *i*, $R_f$ is the return on the risk-free asset, $R_m$ is the return on the benchmark market index and $\beta_i$ measures the sensitivity of firm *i*'s returns to the benchmark market returns.

The above setting discounts out firm level unsystematic risk as investors believe that firm specific risks can be diversified away and hence should not be incorporated into calculating the cost of equity for firm. What matters in evaluating a firm performance is by looking at $\beta_i$, where conventionally it can be estimated via a CAPM where:

$$r_{it} = \alpha_i + \beta_i\left(r_{mt} - r_{ft}\right) + \varepsilon_t \tag{1a}$$

where $r_{it}$ is the return series for firm *i*, $r_{mt}$ is the returns for the market portfolio and $r_{ft}$ is the risk-free return series. The parameter $\alpha_i$ represents the intercept, and $\beta_i = \frac{\text{cov}(r_i, r_m)}{\sigma_m^2}$ is the regression coefficient capturing the sensitivity of firm *i* to the market risk.

The contribution of the CAPM is the idea of benchmarking the firm to the overall market or systematic risk – the comovement of firm with the market. This is powerful in practise as it has avoided the tedious calculation of modern portfolio theory that requires the extremely large portfolio covariance/correlation matrix for establishing an efficient portfolio. By benchmarking to the market, the calculation is reduced from $\left(n^2 - n\right)/2$ to $n$, where in the case of 100 firms, instead of $\left(100^2 - 100\right)/2$ =4,950, we only need to calculate the risk for 100 firms. This simplistic feature may be part of the reason for the CAPM's widespread popularity among practitioners despite the many debates associated with the use of market beta as the only factor that explains variation in stock returns.

### 2.1.1 Local CAPM (LCAPM)

The proponents of segmented world capital market may use the LCAPM. Equation (1) in a local setting is given by:

Cost of Equity = Risk-Free Rates + Premium for Local Systematic Risk

$$CE_i = R_F + \beta_i\left(R_M - R_F\right) \tag{2}$$

where $CE_i$ represents the cost of equity for firm *i*, $R_F$ is the return on the risk-free asset, $R_M$ is the return on the local market index and $\beta_i$ is obtained by regressing firm's returns on the local market returns:

$$r_{it} = \alpha_i + \beta_i\left(r_{Mt} - r_{Ft}\right) + \varepsilon_t \tag{2a}$$

where $r_{it}$ is the compounding returns for firm *i*, $r_{Mt}$ is the compounding returns for the market portfolio and $r_{Ft}$ is the compounding local risk-free rates. The parameter $\alpha_i$ and $\beta_i$ are the intercept and coefficient, respectively.

### 2.1.2 Global CAPM (GCAPM)

In an integrated capital market setting, the expected return is determined by the beta with respect to the world market portfolio multiplied by the world risk premium. Extending equation (1) to a global setting, the GCAPM is given by:

Cost of Equity = Global Risk-Free Rates + Premium for Global Systematic Risk

$$CE_i = R_F^G + \beta_i^G\left(R_M^G - R_F^G\right) \tag{3}$$

where $R_F^G$ is the global risk-free rates, $R_M^G$ the global portfolio returns, and $\beta_i^G$ is obtained by regressing firm's returns on the world market returns:

$$r_{it} = \alpha_i^G + \beta_i^G\left(r_{Mt}^G - r_{Ft}^G\right) + \varepsilon_t \tag{3a}$$

where $r_{Mt}^G$ is the compounding returns for global market portfolio and $r_{Ft}^G$ is the compounding global risk-free rates. The parameter $\alpha_i^G$ and $\beta_i^G$ are the intercept and coefficient, respectively.

2.1.3 Two-factor CAPM (2F-CAPM)

The preceding sections have discussed CAPM under two extreme assumptions, i.e., either the world capital market is fully segmented or is fully integrated. Tests of the classic CAPM under the hypothesis of full market integration have rejected a single source of risk as being adequate in describing cross-section variations of returns across different countries (see Harvey, 1991). This rejection signal could mean that the world capital market is not integrated. Driven by the belief that the world capital market is probably neither fully segmented nor fully integrated, as well as the findings of Bekaert and Harvey (1995) and Bekaert et al. (2005) that some emerging markets are partially integrated into world capital market, this study proposes a two-factor model which introduces a global market factor into the classic CAPM, hereafter denoted as 2F-CAPM.[1]

In the case of 2F-CAPM, the model includes both kinds of premiums, one for the security's exposure to the return on the local market portfolio and another for the exposure to the return on the world market portfolio. Therefore, the model captures the sensitivity of a firm's returns not only to the local market movements, but also to the global factor. The cost of equity under 2F-CAPM is given by:

Cost of Equity = Risk-Free Rates + Premium for Local Systematic Risk
+ Premium for Global Systematic Risk

$$CE_i = R_F + \beta_{Li}\left(R_M - R_F\right) + \beta_{Gi}\left(R_M^G - R_F^G\right) \tag{4}$$

Note that $\beta_{Li}$ and $\beta_{Gi}$ in equation (4) is denoted differently from the $\beta$ coefficients in equation (2) and (3). This is to highlight the fact that they are coefficients measuring partial sensitivity of firm returns to the local and world market movements, respectively. The beta estimation for the 2F-CAPM is given as below:

$$r_{it} = \alpha_i + \beta_{Li}\left(r_{Mt} - r_{Ft}\right) + \beta_{Gi}\left(r_{Mt}^G - r_{Ft}^G\right) + \varepsilon_t \tag{4a}$$

In conjunction with the findings of Estrada (2002) and Chen and Chen (2004) that downside beta has a stronger explanatory power on stock returns than the standard beta, this study proposes a downside version of the LCAPM, GCAPM and 2F-CAPM. The three models are discussed in more details in the following section.

2.1.4 Downside CAPM (DCAPM)

The calculation of downside beta involves isolating instances when both the firm and the local market index returns are less than the risk-free rate. From here, two new 'downside' series were generated and the beta was calculated for these series, using simple linear regression. This beta is called 'downside beta', denoted $\beta_i^D$ for firm *i*:

Cost of Equity = Risk-Free Rates + Premium for Downside Systematic Risk

$$CE_i = R_F + \beta_i^D \left(R_M - R_F\right) \tag{5}$$

where $$\beta_i^D = \frac{E\left[\min\{(r_{it} - r_{Ft}),0\}\min\{(r_{Mt} - r_{Ft}),0\}\right]}{E\left\{\left[\min(r_{Mt} - r_{Ft}),0\right]^2\right\}} \tag{5a}$$

is estimated from the regression of the two newly generated downside series of $\min\{(r_{it} - r_{Ft}),0\}$ and $\min\{(r_{Mt} - r_{Ft}),0\}$ (see Estrada, 2002).

2.1.5 Downside GCAPM (DGCAPM)

Using Estrada's approach, the downside risk model can be extended to GCAPM. The rationale is that even if the market is globally integrated, investors might still have a preference for asymmetric risk. We thus include the downside version of the GCAPM where we term as DGCAPM, as shown below:

Cost of Equity = Risk-Free Rates + Premium for Global Downside Systematic Risk

DGCAPM: $$CE_i = R_F^G + \beta_i^{DG}\left(R_M^G - R_F^G\right) \tag{6}$$

where $$\beta_i^{DG} = \frac{E\left[\min\{(r_{it} - r_{Ft}^G),0\}\min\{(r_{Mt}^G - r_{Ft}^G),0\}\right]}{E\left\{\left[\min(r_{Mt}^G - r_{Ft}^G),0\right]^2\right\}} \tag{6a}$$

2.1.6 Two-factor Downside CAPM (2F-DCAPM)

Similarly, the downside betas for the two-factor CAPM were estimated from the followings:

Cost of Equity = Risk-Free Rates + Premium for Local Downside Systematic Risk
+ Premium for Global Downside Systematic Risk

$$CE_i = R_F + \beta_{Li}^D\left(R_M - R_F\right) + \beta_{Gi}^D\left(R_M^G - R_F^G\right) \tag{7}$$

where $$\beta_{Li}^D = \frac{E\left[\min\{(r_{it} - r_{Ft}),0\}\min\{(r_{Mt} - r_{Ft}),0\}\right]}{E\left\{\left[\min(r_{Mt} - r_{Ft}),0\right]^2\right\}} \tag{7a}$$

$$\beta_{Gi}^D = \frac{E\left[\min\{(r_{it} - r_{Ft}^G),0\}\min\{(r_{Mt}^G - r_{Ft}^G),0\}\right]}{E\left\{\left[\min(r_{Mt}^G - r_{Ft}^G),0\right]^2\right\}} \tag{7b}$$

where $\beta_{Li}^D$ is the downside local beta and $\beta_{Gi}^D$ the downside global beta (with respect to the U.S. market).

2.1.7 The Non-CAPM Cost of Equity: Estrada Model

Existing empirical evidence has questioned the validity of the classical CAPM for emerging markets. For example, Harvey (1995) and Estrada (2000) showed that standard betas are not correlated with returns computed for the world market. In addition, the beta values seem to be too small to reflect cost of equity that most investors deem as reasonable. These problems have led some scholars to look for measures of risk beyond the realm of CAPM. One of such alternatives is offered in Estrada (2000, 2001).

In the classical one-factor CAPM, beta coefficient is used as the only risk measure in the calculation of cost of equity. However, Estrada (2000, 2001) argued that beta is not appropriate to estimate the cost of equity for emerging market and suggests several risk variables, namely, total risk as measured by the standard deviation of returns and downside risks as measured by the semi-deviation of returns and downside beta.

2.1.7.1 Standard Deviation of Returns (Total Risk)

From a local investor perspective, the general framework of Estrada's model can be given as:

Cost of Equity = Risk-Free Rates + Premium for Total Risk

$$CE_i = R_f + \sigma_i \left( R_m - R_f \right) \quad (8)$$

The total risk for the stock returns of any particular firm is basically given by the simple standard deviation of the return series, $\sigma_{\mathrm{i}} = \sqrt{\frac{1}{\mathrm{T}} \sum_{t=1}^{T} \left( r_{it} - \overline{r_i} \right)^2}$ (8a)

2.1.7.2 Semi-Deviation of Returns (Downside Risk)

Downside risk is not a new concept. It was first suggested by Roy (1952) who believes investors will prefer safety of principal first and will set some minimum acceptable return that will preserve the principal. Roy's concept became influential in the development of downside risk measures. The cost of equity measure for this model can be written as:

Cost of Equity = Risk-Free Rates + Premium for Downside Risk

$$CE_i = R_f + \delta_{R_{ft},i} \left( R_m - R_f \right) \quad (9)$$

The semi-deviation measures the average deviation of returns below the risk-free rate:

$$\delta_{R_{ft},i} = \sqrt{\frac{1}{\mathrm{T}} \sum_{t=1}^{T} \left( \min\left\{ \left( r_{it} - r_{ft} \right), 0 \right\} \right)^2} \quad (9a)$$

The $\delta_{R_{ft},i}$ measure obtained was then applied to equation (8) in replacement of $\sigma_i$ to calculate the firm-level cost of equity.

2.2 Determinants of Cost of Equity

In the search for potential factors that determine cost of equity, we consider some of the firm's financial ratios and a few other measures that investors might consider when investing. The determinants and the hypothesized relationship with cost of equity are as below:

a) Debt-to-Equity Ratio, DE (positive): The finance literature stressed a direct relationship between debt-to-equity ratio and cost of equity of a firm. The argument is that the tax benefit of debt diminishes beyond a certain point, and the additional financial risk outweighs the lower nominal cost of debt, thereby increasing the cost of equity, reflecting the increase in the financial risk of a firm. DE is defined as total debt divided by total market value of equity ratio at the end of year.

b) Return-to-Equity, ROE (positive/negative): In general, the higher the ROE, the better off are the firm's common stockholders. On the other hand, it can be argued that since only stockholder's equity appears in the denominator, the ROE is influenced directly by the amount of debt. Given two firms with the same earnings, the firm that uses more debt financing will appear to have higher ROE. This is because with relatively higher debt financing, the firm is able to spread its earnings over a smaller base of stockholders' equity. Therefore, it is debatable whether the sign should be positive or negative. ROE is defined as earnings available for common stockholders divided by common stock equity.

c) Sales-to-Assets, SA (negative): Ang et al. (2000) argued that asset turnover ratio measures management's efficiency in utilizing assets. Firms with higher asset turnover ratio have lower cost of equity in the framework of Ang et al. (2000) because it is a reflection of lower managerial agency problem. Their findings are supported by Singh and Nejadmalayeri (2004) who suggested that managerial efficiency in utilization of firm resources has a positive effect on firm's cost of equity. SA is defined as total sales divided by total assets.

d) Payout ratio, POUT (positive): The payout ratio measures the proportion of earnings that is paid out as dividends. Consistent with Myers's (1984) pecking order theory, firms prefer internal financing (retained earnings) to external financing (debt and external equity financing) because of floatation costs of new security issues. Relatively, internal financing is less costly than external financing. High payout ratio means the portion of retained earnings available for reinvestment purposes will be less. As a result, firms may have to use external financing when investment opportunities occur. Anticipating larger risks in terms of higher debt ratios in the future, investors will demand higher returns. Therefore, higher cost of equity. POUT is defined as dividends per share divided by earnings per share for the last financial period.

e) Firm Size, SIZE (negative): Bloomfield and Michaely (2004) reported that analysts expect large firms to have slightly less risk and therefore higher returns compared to small firms. In such a case, there should be a negative relationship between size and the cost of capital. Recent studies (Hail and Leuz, 2006; Chen et al., 2004) have found a significant negative relationship between firm size and the cost of equity. SIZE is defined as natural logarithm of market value of a firm's outstanding common stock at the end of each year.

f) Book-to-Market Ratio, BM (posititve/negative): Fama and French (1993) showed that the BM ratio is an important valuation measure for explaining average stock returns. The ratio may act as a proxy for distress risk factor since financially distressed firms are likely to have high BM. Gode and Mohanram (2003) also point out that higher BM reflects higher perceived risk.

   On the contrary, Erb et al. (1996) found the BM ratio to be negatively related to a country's economic risk rating, which indicates that as the risk rating improves, the ratio decreases. As stated by Ameer (2007), one of the important implications of Erb et al.'s finding is that if cash flows to emerging markets are related to better economic fundamentals and the stock valuation reflects these, then there should be a negative relationship between the BM ratio and cost of equity. BM is defined as the market value of the ordinary (common) equity divided by the balance sheet value of the ordinary (common) equity.

g) Stock liquidity, SL (negative): Stock liquidity is an important attribute since highly liquid stocks can be bought and sold with minimal impact on stock prices. On the contrary, an illiquid stock will increase cost of trading because of the difficulty to trade the stocks. The influence of trading costs on investors required returns was examined by Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996) and Jacoby et al. (2000), that showed a direct link between liquidity and firm's cost of capital. Following Brennan et al. (1998) and Chordia et al. (2001), the natural logarithm of annual trading volume is used as the proxy for SL.

h) Dividend Yield, DY (positive): The notion of using dividend yield to forecast returns is not new. Evidence to support the hypothesis can be found in the study of Rozeff (1984), Campbell and Shiller (1988), Fama and French (1988) and Campbell (1991), among many others. Their findings are in accord with the intuition that stock prices are low relative to dividends when discount rates (cost of equity) and expected returns are high. DY in this study is computed as dividend per share divided by stock price.

i) Earnings per Share, EPS (positive): EPS has similar intuition as DY according to Fama and French (1988). Therefore, a positive relationship is expected. EPS is defined as earnings available for common stockholders divided by number of shares outstanding.

In sum, a total of nine potential independent variables have been identified. As some variables in the list measure similar attributes, we expect highly correlated independent variables. Those with correlation coefficients exceeding 50 percent will be taken out from the model. Remaining factors are tested in the following empirical setting:

$$CE_{it} = \alpha_{it} + \beta_1 VAR_1 + \beta_2 VAR_2 + \beta_3 VAR_3 + ... + \beta_n VAR_n + \varepsilon_{it} \quad (9)$$

where $CE_{it}$ is firm's cost of equity, $\alpha_{it}$ represents intercept, $\beta_1$, $\beta_2$, $\beta_3$,… $\beta_n$ are the regression coefficients, $VAR_1$, $VAR_2$, $VAR_3$,… $VAR_n$ are the possible cost of equity determinants and $\varepsilon_{it}$ the error term. The above setting is estimated with a panel regression which allows us to control for the firm effect.

### 2.3 Data Description

Weekly data were used in the estimation of all risk measures. The sample period for this study covers 5 January 2000 until 31 December 2008. The risk measures were estimated for every year of the sample period based on the weekly observations of the relevant year. All data were collected from DataStream, which include the weekly prices of stocks listed on the Main Board of Bursa Malaysia as well as the market indices of the U.S. Weekly frequency is preferable because daily series has more noise that may affect the quality of the cost of equity estimates.[2] The annual averages of the monthly 3-month Treasury bill rates of Malaysia and U.S. were used for the local and global risk-free rate, respectively. The variables used for exploring the determinants of firm's cost of equity were also obtained from the DataStream database on yearly basis.

The calculation of costs of equity involves the local and global market risk premiums. Following Damodaran (2002), the sovereign bond premium approach was used to solve the problem associated with the estimation of market risk premium for emerging markets. Accordingly, the Malaysian equity risk premium was computed as the sum of the premium of a developed market (i.e., the U.S. for this study). Given that only annual risk premiums are available, the costs of equity were calculated on annual basis.

We include firms from seven sectors of the Main Board in Bursa Malaysia. After filtering out new firms which were listed after 2000 because they do not have a complete series of data for the full sample period, we have a total of 413 firms available for analysis. They are from Construction (32 firms), Consumer Products (57 firms), Industrial (138 firms), Plantations (23 firms), Properties (58 firms), Trade & Services (92 firms) and Technology (13 firms). Finance sector is excluded from the study due to different interpretation of certain financial ratios. Mining is also excluded because only two firms passed the filtering process.

## 3. Results and Discussion

### 3.1 Selection of the Best Model

Table 1 shows the annual returns of Malaysian firms by sector, both local and global risk-free rates and market risk premiums (extracted from Damodaran's website) for local as well as global market. Overall, there are large fluctuations in the firm annual returns. Negative returns were recorded in 2000 but in 2001, huge improvement can be seen for all firms, with the Consumer Products, Technology and Plantations sectors recorded positive returns. The annual returns deteriorated in the following year but improved in 2003. Nevertheless, all the sectors show positive annual returns in 2007, a major improvement from year 2000. In 2008, all the sectors experienced a sharp decline in their average annual returns. Local and global risk-free rates have been declining since 2000 and showed sign of increase only in 2004. However, both rates declined again in 2007 and experienced a further drop in 2008. On the contrary, both local and global market risk premium has remained relatively stable around 6.5% and 5%, respectively.

**Insert Table 1 about here**

Estimated risk measures from equations (2a), (3a), (4a), (5a), (6a), (7a, b), (8a) and (9a) are presented in Table 2. In line with Estrada's (2000, 2001) findings, our semi-deviation estimates are lower than those of standard deviation, while estimated downside betas are greater than standard betas for both the one-factor and two-factor models. Estimated betas for CAPM is roughly three times higher than GCAPM, suggesting firm returns are more responsive to the variations in the local market than to the world market movements. The estimated betas for five out of seven sectors have average figures of greater than one. This means the five sectors have higher risk exposure than the market. The other two sectors, Consumer Products and Plantations have lower average betas of 0.78 and 0.97, respectively. On the contrary, the estimated betas for GCAPM are less than 0.5, suggesting the stock returns are less responsive to global market returns. Estimated downside betas have been consistently above one for both the CAPM and GCAPM models. When both the local and global factors appear together in the two-factor model, the local betas end up with average values greater than the global betas. This is also true for its downside version. This finding is consistent with the observation for the one-factor model.

**Insert Table 2 about here**

A panel regression analysis is performed where actual returns for all firms were regressed against each of the different risk measures and the explanatory power of the estimated models is compared. Risk measures that have good explanatory power are also better measures for the calculation of cost of equity. The annual risk measures as well as the annual actual returns of all the 413 firms were stacked by year and by firm. The panel regression controls for firm specific effects as well as period effects. Table 3 and Table 4 report the $R^2$ and adjusted $R^2$ figures, respectively, for the different risk measures according to sectors. The risk measure with the highest $R^2$ and adjusted $R^2$ is considered to yield the best model. The result generally shows that downside risk measures are better than its standard risk counterparts (except for the single factor model). This finding is in line with Estrada (2000, 2001, 2002). Not only that, the model which considers both local and global risk factors has higher explanatory power than model that considers only a single risk factor. Based on the average rankings from the selection criteria, the semi-deviation approach is ranked one and therefore, yields the best model. This model explains about 40% of variations in stock returns and for some sectors, the figure goes up to more than 50%. Therefore, cost of equity estimates were obtained using semi-deviation and used in the subsequent step of analysis, that is to explore for determinants of cost of equity.

**Insert Table 3 about here**

**Insert Table 4 about here**

3.2 Determinants of the Asset Pricing Based Cost of Equity

The strength of linear relationship between explanatory variables was examined to check for potential multicollinearity. The results from Table 5 indicate that DE has high correlation with BM and SL is highly correlated to SIZE. Therefore, DE and SL were dropped to avoid the problem of multicollinearity. The stationarity properties of all the variables were established. The results are not shown here to conserve space but are available upon request. Basically, the result implies that all the panel series are stationary at level, or they are all I(0) series.

Results on the panel regressions of the potential determinants on firm's cost of equity are given in Table 6. Results from both $R^2$ and adjusted $R^2$ suggest that the variables have reasonably strong explanatory power on the cost of equity of Malaysian firms. Four variables turned out to be significant. These are SIZE, BM, POUT and ROE.

Consistent with the studies of Hail and Leuz (2006) and Chen et al. (2004), we found a significant negative relationship between SIZE and the cost of equity. This supports the view that larger firms are able to gain economies of scale in raising funds and thus should have a lower cost of equity compared to smaller firms. BM is negatively related to cost of equity. This result seems to support the finding of Erb et al. (1996). The variable PAYOUT is significantly negative at 1% level. This indicates that a high payout ratio, or where more of a firm's earnings are payout as dividend, will lead to lower cost of equity and vice versa. This observation nonetheless, does not provide support for Myers's (1984) pecking order theory. The results show that that ROE is negatively related to the cost of equity. Generally, investors favour firms with higher ROE, at least for the case of Malaysia.

## 4. Conclusion

The aim of this study is to explore for determinants of cost of equity for the Malaysian firms. Unlike previous studies where the model used for estimating cost of equity is pre-determined, we considered a few alternative models and selected that with the highest explanatory power for the analysis. A list of potential factors was identified and the results show that firm's size, book-to-market ratio, payout ratio and return to equity explain the cost of equity significantly.

Our study reveals some interesting findings on the relationship between cost of equity and its determinants, specifically the book-to-market ratio and payout ratio. Fama and French (1996) suggested that firms with high book-to-market are a sign of financial distress and therefore will command a higher premium for taking these additional risks. However, our results show the book-to-market ratio is negatively related to cost of equity, suggesting financial distressed firms could have low book-to-market ratio, thereby demanding a higher required return. Apart from the findings of Erb et al. (1996) which provided support for our results, Dichev (1998) and Zaretzky and Zumwalt (2007) also reported that most distressed firms have low book-to-market ratios. Our observation on the payout ratio does not conform to the conventional wisdom, too. We find that payout ratio is negatively related to firm's cost of equity, suggesting higher dividend payouts leads to lower cost of equity. Perhaps the concept of time value of money can be used to explain this phenomenon and this suggests the need for further studies.

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**Footnotes**

1. A two-factor setting is common in the literature of asset pricing for partially integrated markets. However, there are a few different approaches to deal with partially integrated pricing, see for example, Errunza and Losq (1985), Errunza et al. (1992), Kearney (2000) and Gérard et al. (2003).

2. For the weekly series, Wednesday closing prices are collected to avoid the Monday and Friday effects.

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Table-1 Annual Average of Firm Returns, Risk-Free Rates and the Market Risk Premiums (in percent)

| **Year** | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **Grand Mean** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Firm Returns** | | | | | | | | | | |
| Construction | -33.25 | 4.70 | -18.53 | 36.55 | -28.31 | -39.13 | 32.51 | 46.11 | -63.11 | -6.94 |
| Consumer Products | -24.94 | 0.46 | -15.61 | 14.21 | -3.89 | -9.38 | 8.42 | 7.89 | -31.05 | -5.99 |
| Industry | -30.97 | -2.97 | -16.59 | 31.00 | -10.06 | -38.54 | 20.19 | 10.61 | -46.30 | -9.29 |
| Plantations | -30.55 | 9.29 | 10.56 | 16.07 | 10.16 | -4.37 | 28.69 | 55.75 | -48.51 | 5.23 |
| Property | -55.94 | -4.07 | -23.22 | 27.96 | -7.61 | -39.69 | 28.39 | 45.69 | -70.17 | -10.96 |
| Technology | -48.52 | 2.09 | -18.09 | 29.76 | -32.08 | -47.46 | 11.31 | -6.15 | -53.61 | -18.08 |
| Trading/Services | -29.95 | -3.62 | -17.49 | 26.66 | -3.11 | -22.92 | 20.73 | 19.33 | -52.38 | -6.97 |
| **Risk-free Rate** | | | | | | | | | | |
| Local | 7.30 | 4.78 | 3.66 | 2.46 | 2.82 | 4.57 | 6.12 | 5.75 | 4.05 | 4.61 |
| Global | 6.00 | 3.48 | 1.64 | 1.03 | 1.39 | 3.22 | 4.85 | 4.48 | 1.42 | 3.06 |
| **Market Risk Premium** | | | | | | | | | | |
| Local | 6.81 | 6.81 | 6.54 | 6.25 | 6.27 | 6.15 | 6.19 | 6.07 | 7.63 | 6.52 |
| Global | 5.51 | 5.51 | 4.51 | 4.82 | 4.84 | 4.80 | 4.91 | 4.79 | 5.00 | 4.97 |

Table-2 Average Risk Measures by Sector

| | Construction | Consumer Products | Industry | Plantations | Properties | Technology | Trading | Grand Mean |
|---|---|---|---|---|---|---|---|---|
| $\beta_i$ | 1.1864 | 0.7846 | 1.0098 | 0.9664 | 1.3058 | 1.0692 | 1.0983 | 1.0601 |
| $\beta_i^D$ | 1.8280 | 1.3734 | 1.7335 | 1.4624 | 1.8697 | 1.6926 | 1.6530 | 1.6589 |
| $\beta_i^G$ | 0.4153 | 0.2105 | 0.2937 | 0.2973 | 0.4120 | 0.4910 | 0.3211 | 0.3487 |
| $\beta_i^{DG}$ | 1.4450 | 1.0219 | 1.3375 | 1.0404 | 1.3940 | 1.2868 | 1.2690 | 1.2564 |
| $\beta_{Li}$ | 1.1652 | 0.7869 | 1.0094 | 0.9627 | 1.3023 | 1.0049 | 1.0967 | 1.0469 |
| $\beta_{Gi}$ | 0.0606 | -0.0095 | -0.0028 | 0.0091 | 0.0168 | 0.2035 | 0.0003 | 0.0397 |
| $\beta_{Li}^D$ | 1.4572 | 1.0470 | 1.3976 | 1.1737 | 1.5553 | 1.3541 | 1.2948 | 1.3257 |
| $\beta_{Gi}^D$ | 0.7037 | 0.5164 | 0.6532 | 0.4466 | 0.6774 | 0.6428 | 0.6235 | 0.6091 |
| $\sigma_i$ | 4.2932 | 3.5166 | 4.3527 | 3.2681 | 4.4535 | 3.9522 | 4.0783 | 3.9878 |
| $\delta_{R_{ft},i}$ | 6.3377 | 5.0873 | 6.3244 | 5.0140 | 6.6647 | 5.7060 | 6.0219 | 5.8794 |

Table-3 $R^2$ from Regression of Firm Returns on Various Risk Measures

| Model | Construction | Consumer Products | Industry | Plantations | Properties | Technology | Trading | Grand Mean |
|---|---|---|---|---|---|---|---|---|
| CAPM | 0.5527 | 0.3170 | 0.3949 | 0.6063 | 0.5808 | 0.5268 | 0.3679 | 0.4109 |
| GCAPM | 0.5364 | 0.2967 | 0.3955 | 0.6057 | 0.5866 | 0.5400 | 0.3673 | 0.4085 |
| DCAPM | 0.5380 | 0.2943 | 0.3923 | 0.6059 | 0.5764 | 0.5304 | 0.3602 | 0.4027 |
| DGCAPM | 0.5398 | 0.2939 | 0.3963 | 0.6142 | 0.5742 | 0.5276 | 0.3664 | 0.4044 |
| 2FCAPM | 0.5651 | **0.3246** | 0.3955 | 0.6071 | 0.5884 | 0.5480 | 0.3700 | 0.4123 |
| 2FDCAPM | 0.5667 | 0.3211 | 0.3972 | 0.6112 | **0.5988** | 0.5292 | 0.3696 | 0.4137 |
| SMSTD | **0.5781** | 0.3143 | **0.4213** | 0.6162 | 0.5904 | **0.5848** | **0.4181** | **0.4366** |
| STD | 0.5394 | 0.3032 | 0.4060 | **0.6415** | 0.5963 | 0.5272 | 0.3682 | 0.4152 |

Table-4 Adjusted $R^2$ from Regression of Firm Returns on Various Risk Measures

| | Construction | Consumer Products | Industry | Plantations | Properties | Technology | Trading | Grand Mean |
|---|---|---|---|---|---|---|---|---|
| CAPM | 0.4807 | 0.2179 | 0.3143 | 0.5375 | 0.5201 | 0.4257 | 0.2811 | 0.3356 |
| GCAPM | 0.4619 | 0.1947 | 0.3149 | 0.5368 | 0.5268 | 0.4417 | 0.2804 | 0.3329 |
| DCAPM | 0.4637 | 0.1919 | 0.3113 | 0.5370 | 0.5151 | 0.4301 | 0.2722 | 0.3264 |
| DGCAPM | 0.4658 | 0.1915 | 0.3158 | 0.5468 | 0.5126 | 0.4268 | 0.2793 | 0.3284 |
| 2F-CAPM | 0.4911 | 0.2233 | 0.3137 | 0.5333 | 0.5268 | 0.4406 | 0.2815 | 0.3369 |
| 2F-DCAPM | 0.4930 | **0.2191** | 0.3156 | 0.5382 | **0.5387** | 0.4173 | 0.2810 | 0.3384 |
| SMSTD | **0.5102** | 0.2148 | **0.3442** | 0.5491 | 0.5311 | **0.4961** | **0.3382** | **0.3646** |
| STD | 0.4653 | 0.2021 | 0.3269 | **0.5788** | 0.5379 | 0.4262 | 0.2814 | 0.3405 |

Notes: SMSTD refers to semi-deviation and STD refers to standard deviation of returns.

Table-5 Correlation Matrix of the Potential Determinants of Cost of Equity

| | COE | DY | EPS | SIZE | ROE | BM | CR | SA | DE | SL | POUT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COE | 1.0000 | -0.2654 | -0.1265 | -0.3788 | -0.1613 | -0.1269 | -0.0474 | -0.0051 | -0.0022 | 0.0347 | -0.3777 |
| DY | -0.2654 | 1.0000 | 0.1076 | 0.2001 | 0.1660 | 0.0445 | 0.0226 | 0.0162 | -0.0576 | -0.0991 | 0.4847 |
| EPS | -0.1265 | 0.1076 | 1.0000 | 0.2905 | 0.1496 | 0.1998 | 0.0187 | 0.0070 | -0.0148 | 0.0621 | 0.1306 |
| SIZE | -0.3788 | 0.2001 | 0.2905 | 1.0000 | 0.1948 | 0.2506 | 0.0162 | 0.0066 | -0.0299 | 0.5208 | 0.3588 |
| ROE | -0.1613 | 0.1660 | 0.1496 | 0.1948 | 1.0000 | 0.0783 | 0.0315 | 0.1184 | -0.0989 | 0.0244 | 0.2016 |
| BM | -0.1269 | 0.0445 | 0.1998 | 0.2506 | 0.0783 | 1.0000 | -0.0038 | -0.0085 | 0.5618 | 0.0836 | 0.1600 |
| CR | -0.0474 | 0.0226 | 0.0187 | 0.0162 | 0.0315 | -0.0038 | 1.0000 | 0.0049 | -0.0544 | -0.0364 | 0.0433 |
| SA | -0.0051 | 0.0162 | 0.0070 | 0.0066 | 0.1184 | -0.0085 | 0.0049 | 1.0000 | -0.1048 | -0.0244 | 0.0182 |
| DE# | -0.0022 | -0.0576 | -0.0148 | -0.0299 | -0.0989 | 0.5618* | -0.0544 | -0.1048 | 1.0000 | 0.0019 | -0.0872 |
| SL# | 0.0347 | -0.0991 | 0.0621 | 0.5208* | 0.0244 | 0.0836 | -0.0364 | -0.0244 | 0.0019 | 1.0000 | -0.0610 |
| POUT | -0.3777 | 0.4847 | 0.1306 | 0.3588 | 0.2016 | 0.1600 | 0.0433 | 0.0182 | -0.0872 | -0.0610 | 1.0000 |

(*) high correlation, (#) to be dropped to avoid multicollinearity.

Table-6 Estimates of the Panel Model for Cost of Equity

| Variables | Coefficient | P-value |
|---|---|---|
| C | 42.24176 | (0.0000)** |
| DY | -0.15777 | 0.4634 |
| EPS | 0.080474 | 0.8808 |
| SIZE | -3.0697 | (0.0002)** |
| ROE | -0.00459 | (0.0989)* |
| BM | -0.35368 | (0.0715)* |
| CR | -0.00999 | 0.5063 |
| SA | -0.00015 | 0.8342 |
| POUT | -0.01881 | (0.0005)** |
| R-squared | 0.631306 | |
| Adjusted R-squared | 0.57973 | |
| Durbin-Watson statistic | 1.769416 | |
| F-statistic | 12.24022 | (0.0000)** |

Note: * and ** denote significance at the 0.10 and 0.01, respectively.