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MEASURING THE COST OF EQUITY OF EMERGING MARKET FIRMS: THE CASE OF MALAYSIA

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ABSTRACT

Valuation in an emerging market like Malaysia poses to be a great challenge because there is no clear single 'best practice' for the valuation of assets and securities in emerging markets. Adopting some of the emerging market models reviewed in Pereiro (2001), together with the two-factor CAPM models proposed in this study, we make a comparison between standard risk measures and downside risk measures to estimate the cost of equity of Malaysian firms over the period of 2000–2007. Overall, the results are consistent with the literature which supports downside risk measures over standard risk measures. Also, our model, which considers both local and global risk factors, has higher explanatory power than models that consider only one kind of risk factor. Most importantly, the results show that unsystematic risks, or firm-specific risks, may have increased in recent years.

Keywords: *CAPM, cost of equity, downside risk, firm*

INTRODUCTION

The full impact from the worldwide recession triggered by the US subprime mortgage crisis in 2008 was felt in Malaysia in the first quarter of 2009, when the country's economy contracted by 6.2%. In the third quarter of the same year, the contraction slowed to 1.2%. The improvement has been driven primarily by domestic demand, and its role in the economic recovery is expected to continue into 2010. The Malaysian government realises the important role of domestic demand, and one way of promoting it is to promote domestic investment activity. To make sound investment decisions, investors need valuation practices that are appropriate in the Malaysian context, one of which is Malaysian firms' cost of equity estimation. Nevertheless, valuation in an emerging market like Malaysia represents a great challenge because, unlike in developed markets, there is no clear single 'best practice' for the valuation of assets and securities. As the use of an inappropriate valuation model may lead to overestimating or nderestimating the cost of equity, which in turn may cause an otherwise promising/value-destructive investment opportunities to be rejected/accepted, the effect of using a less appropriate model to estimate the cost of equity can be detrimental.

A number of empirical studies show that practitioners in the US (Bruner et al., 1998) and the UK (McLaney et al., 2004) have favoured the Capital Asset Pricing Model (CAPM) to estimate the cost of equity. The CAPM has been popular not only in the developed markets but also in emerging markets (Pereiro, 2006). Therefore, it is not surprising to find specific adjustments being made to the popular CAPM to better suit an emerging market setting. Nevertheless, Harvey (1995) found that betas of emerging markets were largely uncorrelated to variation in expected returns in a single-factor model framework. The implication of his study is that beta does not accurately measure risk in emerging markets. A few models proposed to estimate cost of equity in emerging markets were reviewed in Pereiro (2001). Among them, Estrada (2000, 2001) proposed the use of downside risks as alternative risk measures to market beta. Downside risk is not a new concept. It was first suggested by Roy (1952), who believed that investors will first prefer safety of principal and will set some minimum acceptable return that will preserve the principal. Roy's concept becomes influential in the development of downside risk measures. Earlier studies, such as those of Hogan and Warren (1974), Bawa and Lindenberg (1977) and Harlow and Rao (1989), have also proposed CAPM-like models based on downside risks. Recent research has tried to compare the performance of standard risk measures with that of downside risk measures. Estrada (2000, 2001, 2007) and Chen and Chen (2004), for example, have found that the downside risk measure has strong explanatory power for stock returns.

While there have been a few models developed specifically for emerging markets like Malaysia, global factors are not currently considered in those models. Because Malaysia is partly integrated into the global capital market, it is exposed to not only local factors but also global factors. Clearly, there is a gap in the literature, where both local factors and global factors need to be incorporated in the estimation of the cost of equity. Therefore, in this study, we aim to answer whether the CAPM variants developed specifically for emerging markets (as well as the two-factor model proposed in this study) perform better than the classical CAPM in estimating the Malaysian firms' stock returns. This question is relevant to equity valuation and is useful for industry practitioners who may have used the classical CAPM all the while to estimate firms' cost of equity. If other models are proven to have higher explanatory power than the classical CAPM, it means that practitioners should take these models into consideration in their future investment decisions.

The aim of this study is to find the most relevant model to calculate a firm's cost of equity. This is done by regressing different risk measures against the firm's actual stock returns. Risk measures that have good explanatory power are also better measures for the calculation of the cost of equity. In general, previous studies, for example, Estrada (2000, 2001, 2002) and Barnes and Lopez (2006), used the popular R^2 to compare the performance of several models. In this study, five standard model selection criteria are used, namely, Akaike's Information Criterion (AIC), the Schwarz Criterion (SC), R^2, Adjusted R^2, and Log Likelihood. Moreover, acknowledging that all the models are one-factor models that perceive the market as being exposed solely to either local factors or global factors, this study proposed a two-factor model so that the model captures the sensitivity of stock returns not only to the local market movements but also to global factors. Another contribution of the study is that the study is done from the perspective of local investors. There are a number of studies in the literature that provide empirical evidence from the perspective of US or UK investors, for example, but studies finding empirical evidence from the perspective of local investors are rare. In a time where the Malaysian economy is affected by global economic declines, the forces of domestic demand may help to cushion the effect. In this regard, better valuation practices may enhance the flow of local investment capital.

The rest of this paper is as follows. The next section discusses the methods and data used in this study follows by discussion on the results. The final section concludes and discusses possible implications of the results.

METHODOLOGY

This section explains the methods we applied in estimating various risk measures, the models used for calculating the cost of equity and the data used for this study.

The Measures for the Cost of Equity

In finance, the cost of equity is defined as the discount rate that equates all future dividends in perpetuity to the current market price of a firm's stock. It can also be seen as the minimum rate of return that a firm must offer to compensate stockholders for delaying their consumption and for bearing some risk. There are various ways to calculate a firm's cost of equity. In general, the cost of equity can be summarised as follows:

$$\text{Cost of Equity} = \text{Risk-Free Rates} + \text{Risk Measure} \times \text{Risk Premium} \tag{1}$$

What equation (1) suggests is that a firm must compensate the equity holders by delivering a rate of return that is high enough to cover the risk-free rates plus a risk premium that is commensurate with the underlying risk factor. The above equation is based on modern finance, where we assume that the main concerns of a typical investor are the risks and returns. The challenge here is to determine how we are going to determine the risk measure of a firm. Based on the existing literature, we have several alternatives, which will be discussed in the following sections.

The CAPM cost of equity

The classical way of obtaining the cost of equity is by using a risk measure estimated via the CAPM model, which was developed in the 1960s by Sharpe (1964), Lintner (1965) and Mossin (1966). What this CAPM suggests is that the cost of equity of a firm can be estimated by referring to the risk-free rate and the systematic risk. The annual CAPM cost of equity is given by

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

$$CE_i = R_f + \beta_i (R_m - R_f)\ , \tag{2}$$

where CE_i represents the cost of equity for firm *i*, R_f is the annualised return on the risk-free asset, R_m is the annualised return on the benchmark market index and β_i is the systematic risk measure for firm *i*.

Before we can calculate the cost of equity suggested in equation (2), we follow a two-step procedure to estimate the risk measure β_i from the following CAPM using weekly data:

$$r_{it} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \varepsilon_t\ , \tag{2a}$$

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

Equation (2) basically states that the cost of equity of a firm comprises a risk-free rate and the firm's market risk sensitivity multiplied by the market risk premium. The contribution of the CAPM is the idea of benchmarking the firm against the overall market risk, also known as systematic risk—that is, the co-movement of the firm with the market. This is powerful in practice, as it has allowed modern portfolio theory to avoid tedious calculation to obtain an extremely large portfolio covariance/correlation matrix in establishing an efficient portfolio. By benchmarking the firm to the market, the calculation is reduced from $n^2 - n$ /2 to n, where, in the case of 100 firms, instead of using $100^2 - 100$ /2 =4,950, we only need to calculate the risk for 100 firms.

CAPM-based models for emerging markets are basically extensions and modifications from the classical one-factor US CAPM. When investors believe the emerging market is segmented, the cost of equity can be estimated via equation (2), where all the parameters are acquired from the emerging market itself. Equation (2), in this sense, is known as a local CAPM (LCAPM). In this kind of setting, according to Pereiro (2006), the risk-free rate in the LCAPM is the sum of the global (US) risk-free rate and a country risk premium. The country risk premium can be seen as a complex composite of different country-related risks such as political turmoil, sovereign default probability, currency fluctuation and so on. It is usually computed as the spread of sovereign bonds over global bonds of similar denominations, yields and terms. Therefore, the risk-free rate for an emerging market can be written as

$$R_f = R_F + R_C \tag{3}$$

where R_F is the global (US) risk-free rate and R_C is the country's risk premium.[1] For this study, the US market is chosen as being representative of the world market. Therefore, the US one-year government bond rate is used as a proxy for the global risk-free rate.

Adjusted local CAPM

One drawback of the LCAPM is that the model tends to overestimate the cost of equity. Godfrey and Espinosa (1996) argued that country risk may already present in the market risk premium and thus that including a country risk premium into the CAPM will double-count risk. Indeed, using credit risk ratings

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[1] Herston and Rouwenhorst (1994) and Griffin and Karolyi (1998) found that the effect of country risk is often more sizeable than the industry effect.

for over 40 developed and emerging economies, Erb et al. (1995) found that, on average, country risk explained about 40% of the variation in market returns, while the remaining 60% was explained by pure stock market risk.

Pereiro (2001) tried to tackle the double-counting problem by proposing an adjusted local CAPM that corrects the systematic risk premium. The model is called the adjusted local CAPM (ALCAPM):

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

$$CE_i = R_f + \beta_i (R_m - R_f)(1 - R_i^2), \quad (4)$$

where R_i^2 is the coefficient of determination of the regression between the volatility of the firm and the volatility of the market. Therefore, the inclusion of $(1 - R_i^2)$ factor into the equation depresses the equity risk premium to partially counter the overestimation problem. The risk measure in equation (4), that is, β_i, is the one obtained from regression (2a).

Global CAPM

The local CAPM is basically in a domestic setting, where firm returns are regressed against local market returns to obtain the risk measure, that is, the systematic risk. Another school of thought stresses that in today's globalised world, with capital mobilisation, the benchmark market index should be the world portfolio. This is because in a highly integrated world capital market, the return premium to any investment is the same for all investors regardless of the currency unit. Extending equation (2) to a global setting, the GCAPM is given by

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

$$CE_i = R_F + \beta_i^G (R_M - R_F) \quad (5)$$

where R_F represents the annualised global risk-free rate, R_M represents the annualised global portfolio return, and β_i^G represents the coefficient that measures a firm's global systematic risk.

GCAPM assumes the complete integration of the world market, and there is no unsystematic risk in the model, since that assumes that geographic diversification makes unsystematic risk disappear. A firm's global beta is obtained by regressing the firm's returns on the world market returns

$$r_{it} = \alpha_i^G + \beta_i^G (r_{Mt} - r_{Ft}) + \varepsilon_t \quad (5a)$$

where r_{Mt} represents the weekly compounding returns for the global market portfolio and r_{Ft} is the weekly compounded global risk-free rates. The parameter α_i^G and β_i^G are the intercept and coefficient, respectively.

Two-factor CAPM

To capture both local and global factors that are relevant, especially to partially integrated markets, such as that of Malaysia, this study proposes a two-factor model that introduces a global market factor into the CAPM.[2] In this case, the model captures the sensitivity of a firm's returns not only to the local market movements but also to the global factor. This proposed model is denoted as 2F-CAPM. The cost of equity can then be obtained by

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

$$CE_i = R_f + \beta_{Li}(R_m - R_f) + \beta_{Gi}(R_M - R_F)\,, \quad (6)$$

where β_{Li} and β_{Gi} are the firm's sensitivities to the local and global risk factors, respectively. Again, the betas are estimated from a two-factor CAPM regression, as shown below:

$$r_{it} = \alpha_i + \beta_{Li}(r_{mt} - r_{ft}) + \beta_{Gi}(r_{Mt} - r_{Ft}) + \varepsilon_t \quad (6a)$$

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 the cost of equity that most investors deem as being reasonable. These problems have led some scholars to look for measures of risk beyond the realm of the CAPM betas. One of these alternatives is offered in Estrada (2000, 2001).

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[2] 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).

In the classical one-factor CAPM, a beta coefficient is used as the only risk measure in the calculation of the cost of equity. However, Estrada (2000, 2001) argued that beta is not appropriate for estimating 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.

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

$$CE_i = R_f + \sigma_i (R_m - R_f) \quad (7)$$

The total risk associated with the stock return of any particular firm is basically given by the simple standard deviation of the return series,

$$\sigma_i = \sqrt{\frac{1}{T}\sum_{t=1}^{T}(r_{it} - \bar{r}_i)^2} \quad (7a)$$

Semi-deviation of returns (downside risk)

Downside risk is not a new concept. It was first suggested by Roy (1952), who believed that investors will first prefer safety of principal and will set some minimum acceptable return that will preserve the principal of their investment. 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

$$CE_i = R_f + \delta_{R_{ft},i} (R_m - R_f) \quad (8)$$

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

$$\delta_{R_{ft},i} = \sqrt{\frac{1}{T}\sum_{t=1}^{T}(\min\{(r_{it} - r_{ft}, 0)\})^2} \quad (8a)$$

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

The CAPM cost of equity: The downside version

This section discusses the downside version of ALCAPM, GCAPM and 2F-CAPM, where the standard risk measure in the respective equation is replaced with a downside risk measure.

Downside CAPM

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 are generated, and beta is calculated for these series using simple linear regression. This beta is called "downside beta", denoted as β_i^D for firm *i*:

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

$$CE_i = R_f + \beta_i^D (R_m - R_f) \, , \tag{9}$$

where $\beta_i^D = \dfrac{E[\min\{(r_i - r_f),0\}\min\{(r_m - r_f),0\}]}{E\{[\min(r_m - r_f),0]^2\}}$ (9a)

is estimated from the regression of the two newly generated downside series.

Downside GCAPM

Following Estrada, 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, which we term as DGCAPM, as shown below:

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

DGCAPM: $$CE_i = R_F + \beta_i^{DG} (R_G - R_F) \, , \tag{10}$$

where $\beta_i^{DG} = \dfrac{E[\min\{(r_{it} - r_{Ft}),0\}\min\{(r_{Gt} - r_{Ft}),0\}]}{E\{[\min(r_{Gt} - r_{Ft}),0]^2\}}$ (10a)

is estimated from the regression of the newly generated firm and the global downside return series.

Downside two-factor CAPM

Downside betas for the two-factor CAPM are first estimated from the following:

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

$$CE_i = R_f + \beta_{Li}^D (R_m - R_f) + \beta_{Gi}^D (R_M - R_F)\,, \tag{11}$$

$$\beta_{Li}^D = \frac{E[\min\{(r_{it} - r_{ft}),0\}\min\{(r_{mt} - r_{ft}),0\}]}{E\{[\min(r_{mt} - r_{ft}),0]^2\}}\ , \tag{11a}$$

$$\beta_{Gi}^D = \frac{E[\min\{(r_{it} - r_{Ft}),0\}\min\{(r_{Mt} - r_{Ft}),0\}]}{E\{[\min(r_{Mt} - r_{Ft}),0^2]\}}\,, \tag{11b}$$

where β_{Li}^D is the downside local beta and β_{Gi}^D is the downside global beta (with respect to the US market).

Data Description

Weekly data are used in the estimation of all of the risk measures. The sample period for this study covers 5 January 2000 until 26 December 2007. The risk measures are estimated for every year of the sample period based on the weekly observations of the relevant year. All of the data are collected from DataStream and include the weekly prices of stocks listed on the Main Board of Bursa Malaysia, bond prices, as well as US market indices. A weekly frequency is preferable because daily series have more noise, which may affect the quality of the estimates of the cost of equity.[3] The annual averages of the monthly 3-month Treasury bill rates of Malaysia and the US are used for the local and global risk-free rates, respectively.

The calculation of the cost of equity involves the local and global market risk premiums. Following Damodaran (2003), the sovereign bond premium approach is used to solve the problem associated with the estimation of market risk premiums for emerging markets. Accordingly, the Malaysian equity risk premium is computed as the sum of the premium of a developed market (i.e., the US for this study) and the Malaysian country risk premium, which is available from Damodaran's website on an annual basis from the year 2000 to 2007.

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

Similarly, the data on global market risk premiums are extracted from this website. Given that only annual risk premiums are available, the costs of equity are calculated on an annual basis in this study.

We include firms from eight 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 557 firms available for analysis. They are from Construction (62 firms), Consumer Products (38 firms), Industrial (196 firms), Finance (33 firms), Plantations (29 firms), Properties (70 firms), Trade & Services (117 firms) and Technology (12 firms). We exclude three sectors, that is, Hotels, Infrastructure Companies, and Tin & Mining, as the number of firms listed under these sectors are limited.

RESULTS AND DISCUSSION

Table 1 shows the annual returns of Malaysian firms by sector, both local and global risk-free rates and market risk premiums (Damodaran, 2003) for local as well as global markets. Overall, there are large fluctuations in the firm annual returns. Negative returns were recorded in 2000, but in 2001, a huge improvement can be seen for all firms, with the Consumer Products, Technology and Plantations sectors recording positive returns. The annual returns deteriorated in the following year but improved in 2003. Nevertheless, all sectors show positive annual returns in 2007, representing a major improvement from the year 2000. Declines have also been observed in local and global risk-free rates from 2000 to 2007. A similar trend is also observed for local and global market risk premiums.

Estimated risk measures from equations (2a), (5a), (6a), (7a), (8a), (9a), (10a), (11a) and (11b) are presented in Table 2. In line with Estrada's (2000, 2001) findings, our semi-deviation figures are lower than those of the standard deviation, while our estimated downside betas are greater than the standard betas for both one-factor and two-factor models. Estimated betas for ALCAPM are much higher than GCAPM, suggesting that firms' stock returns are more responsive to variations in their local market than to global market movements. The estimated betas for six out of eight sectors have average figures that are greater than one.

On the contrary, the estimated betas for GCAPM have figures of less than 0.5, signalling a weak relationship between a firm's stock returns and global market returns. The gap between estimated betas for ALCAPM and GCAPM is far less apparent when their respective downside versions are considered. The estimated downside betas have consistently been above one for both models. When jointly estimating the betas for local and global factors in the two-factor model, local betas end up with average values that are greater than global betas. This is also true for their downside versions. This finding is consistent with the observation from the one-factor model.

On the other hand, the figures for standard deviation are five times higher than those recorded for standard betas, suggesting the presence of a large portion of unsystematic risk. According to the CAPM, the only relevant risk is the systematic risk, which cannot be eliminated through diversification. In other words, the model does not account for unsystematic risk in the compensation to investors, as it assumes that investors hold well-diversified portfolios. If the assumption holds, a standard beta should have high explanatory power for a firm's stock returns. To compare the explanatory power of the various risk measures, a panel regression analysis is performed, where actual returns for all firms are regressed against the different risk measures. Risk measures that have good explanatory power are also better measures of the calculation of the cost of equity.

The annual risk measures, as well as the annual actual returns of all 557 firms, are stacked by year and by firm. The panel regression controls for firm-specific effects as well as period effects. Table 3 reports the standard model selection criteria, namely, AIC, SC, R^2, adjusted R^2, and Log Likelihood figures for the different risk measures by sector. The risk measure with the lowest AIC and SC along with the highest R^2, adjusted R^2, and Log Likelihood value will be considered the best among the risk measures.

Overall, the results are consistent across five criteria. As the table shows, semi-deviation has the lowest AIC and SC values while receiving the highest R^2, adjusted R^2 and Log Likelihood values. Therefore, the semi-deviation emerges as the risk measure with the highest explanatory power for actual stock returns. Two-factor downside betas are ranked second, while the standard beta ranks third. Another two-factor beta is ranked fourth, while the global beta is ranked fifth. Standard deviation ranks sixth, while the other two downside versions of the one-factor model are ranked seventh and eighth, respectively. The result generally shows that downside risk measures are better than their standard risk counterparts, a finding that is in line with Estrada (2000, 2001, 2002). Additionally, a model that considers both local and global risk factors has higher explanatory power than a model that considers only one kind of risk factor. This could mean that the Malaysian market is neither fully integrated into the world market nor segmented from it. Most importantly, Table 3 presents evidence that unsystematic risk is priced into the Malaysian stock market.

Table 1

Annual Firm Returns by Sector and Local and Global Risk-Free Rates and Market Risk Premiums (In Percent)

Year	2000	2001	2002	2003	2004	2005	2006	2007	Grand Mean
Firm Returns									
Construction	–27.6077	–2.4755	–20.5857	12.9593	–4.0776	–13.7247	10.4953	7.7504	–4.6583
Consumer Products	–35.5875	3.2078	–24.6256	22.5704	–26.7119	–40.5281	28.5494	45.3471	–3.4723
Industrial	–34.0162	–6.8943	–26.1047	29.5261	–16.4574	–39.4725	17.0534	10.9223	–8.1804
Finance	–38.7156	–2.7675	–17.4704	24.9698	–0.2153	–17.3592	27.9166	26.1049	0.3079
Trade and Service	–37.5208	–4.6373	–24.9129	25.1527	–6.1428	–28.4703	19.9242	20.9808	–4.4533
Technology	–49.2437	2.5080	–9.2931	24.0554	–27.5915	–50.6211	–6.1992	0.8515	–14.4417
Properties	–54.4454	–5.5424	–25.9710	29.0155	–11.9179	–42.3865	25.7583	48.3692	–4.6400
Plantations	–35.1332	6.9375	4.8589	24.3851	6.9034	–13.2623	27.6705	51.3896	9.2187
Market Return	–16.8956	–3.7858	–3.5184	21.3729	15.4865	–0.8617	19.1261	27.9955	7.3649

(*continued*)

Table 1 (*continued*)

Year	2000	2001	2002	2003	2004	2005	2006	2007	Grand Mean
Risk-Free Rates									
Local	7.3285	6.3206	6.6454	5.4360	5.6971	5.6402	6.0679	5.9102	6.1307
Global	6.0285	5.0206	4.6204	4.0110	4.2721	4.2902	4.7929	4.6352	4.7089
Market Risk Premiums									
Local	6.8100	6.8100	6.5350	6.2450	6.2650	6.1500	6.1850	6.0650	6.3831
Global	5.5100	5.5100	4.5100	4.8200	4.8400	4.8000	4.9100	4.7900	4.9613

The averages of firms' annual cost of equity are calculated from different models; the result is presented in Table 4. As expected, the global beta recorded the lowest average cost of equity. CAPM in a global setting should result in a lower estimate of the cost of equity, as it postulates that the world market portfolio is the only priced risk factor to be considered in the estimation. The world equity market portfolio is considered the optimal market portfolio, where the risk is at its lowest possible value without compromising return. Therefore, the calculated cost of equity should finish lower to justify lower risk. On the other hand, values of the cost of equity calculated based on standard deviation are the highest, while semi-deviation and downside beta produce values of the cost of equity that are between the high figures generated from using the standard deviation and the low figures based on the standard beta. This result is consistent with those found by Estrada (2000, 2001). He commented that downside risk measures (semi-deviation and downside beta) are more relevant in emerging markets, as they result in estimations that are halfway between the "rather low" figures based on beta and the high figures generated from using the standard deviation.

It is also obvious from Table 4 that the use of different models would result in different values of the cost of equity, especially in cases where unsystematic risk is included in estimating risk. For example, values of cost of equity calculated based on total risk and semi-deviation have average values of 36.72% and 26.49%, respectively, while values of cost of equity obtained via various systematic risk models are less than 14%. The difference of at least 16% could be due to unsystematic risks. Given that semi-deviation has higher explanatory power for the variability of stock returns than the other risk measures, investors would have underestimated Malaysian firms' cost of equity if they had used standard CAPM models.

Table 2
Averages of the Estimated Risk Measures

Statistics	Construction	Consumer Products	Industrial	Finance	Trade and Service	Technology	Properties	Plantations	Grand Mean
Single-Factor Model									
β_i^G	0.1986	0.3896	0.2942	0.3687	0.3223	0.4369	0.4060	0.2184	0.3293
β_i	0.8906	1.1251	1.0793	1.2051	1.1690	1.0973	1.3827	0.8810	1.1037
β_i^{DG}	1.1791	1.5349	1.4445	1.1433	1.4094	1.4255	1.5442	1.0758	1.3446
β_i^D	1.5032	1.9063	1.8513	1.5087	1.8107	1.7246	1.9891	1.4265	1.7151
$\delta_{R_{ft},i}$	3.9102	4.7406	4.7499	3.3177	4.3850	4.0716	4.6067	3.2873	4.1336
σ_i	5.7997	6.9352	6.6524	4.8506	6.4592	6.1232	6.9602	5.1833	6.1205

(continued)

Table 2 (*continued*)

Statistics	Construction	Consumer Products	Industrial	Finance	Trade and Service	Technology	Properties	Plantations	Grand Mean
Two-Factor Model									
2F-CAPM-adj									
β_{Li}	0.8983	1.1039	1.0789	1.1990	1.1683	1.0516	1.3806	0.8897	1.0963
β_{Gi}	–0.0292	0.0803	0.0016	0.0229	0.0026	0.1733	0.0078	–0.0333	0.0283
2F-DCAPM-adj									
β_{Li}^{D}	1.1423	1.4636	1.4404	1.2766	1.4336	1.3370	1.6547	1.1892	1.3672
β_{Gi}^{D}	0.6168	0.8340	0.7414	0.5071	0.6754	0.8361	0.7444	0.4514	0.6758

Table 3
The Explanatory Power of Risk Measures on Actual Returns using Panel Regression

Model	R2	AdjR2	LogL	AIC	SC
Panel A: Values					
Semi-Deviation	0.4363	0.3546	–22203.33	10.2192	11.0309
Two-Factor Downside Betas	0.3680	0.2763	–22458.09	10.3340	11.1472
Beta	0.3630	0.2706	–22475.97	10.3416	11.1533
Two-Factor Betas	0.3627	0.2701	–22476.91	10.3424	11.1556
Global Beta	0.3599	0.2672	–22486.47	10.3463	11.1580
Standard Deviation	0.3592	0.2664	–22488.94	10.3474	11.1591
Downside Beta	0.3583	0.2653	–22492.14	10.3488	11.1606
Global Downside Beta	0.3582	0.2652	–22492.47	10.3490	11.1607
Panel B: Ranking					
Semi-Deviation	1	1	1	1	1
Two-Factor Downside Betas	2	2	2	2	2
Beta	3	3	3	3	3
Two-Factor Betas	4	4	4	4	4
Global Beta	5	5	5	5	5
Standard Deviation	6	6	6	6	6
Downside Beta	7	7	7	7	7
Global Downside Beta	8	8	8	8	8

Notes: The total number of observations in the panel regression is 4,456 observations. The panel regression controls for firm effects and time effects (two-way fixed effects).

Table 4

Averages of Firms' Annual Cost of Equity from Different Models (List Down by Smallest Values of Grand Means)

Statistics	Construction	Consumer Products	Industrial	Finance	Trade and Service	Technology	Properties	Plantations	Grand Mean
GCAPM	7.1355	8.0731	7.6091	7.9736	7.7471	8.3292	8.1643	7.2432	7.7844
2F-CAPM	7.2475	8.1106	7.7043	8.9345	8.0002	8.7658	8.3183	7.3786	8.0575
ALCAPM	7.3908	7.7158	7.6948	8.7874	7.9836	7.9579	8.2591	7.5161	7.9132
DALCAPM	7.7727	8.1630	8.1744	9.1505	8.4396	8.3382	8.7247	7.8943	8.3322
2F-DCAPM	10.5870	11.9923	11.5624	11.4349	11.4968	12.1635	12.1543	10.0007	11.4240
DGCAPM	11.9942	13.7410	13.3099	11.7583	13.1278	13.2710	13.7882	11.4841	12.8093
Semi-deviation	25.5618	29.6167	28.6654	22.3153	27.8898	26.4423	28.9815	22.4617	26.4918
Standard Deviation	35.1516	40.6901	39.3737	30.3759	38.3769	36.9549	40.8281	32.0204	36.7215

CONCLUSION

The CAPM developed by Sharpe (1964), Lintner (1965) and Mossin (1966) is widely used and accepted by practitioners worldwide. Unfortunately, empirical evidence on the ability of beta to explain stock returns has been weak, particularly where emerging markets are concerned. Estrada (2000, 2001) proposes the use of downside risks as alternative risk measures to market beta. CAPM-like models based on downside risks have also been proposed in previous studies, such as, Hogan and Warren (1974), Bawa and Lindenberg (1977) and Harlow and Rao (1989). In more recent studies, Estrada (2002, 2007) showed evidence that suggests downside risk measures may be superior to their standard counterparts. Therefore, the aim of this study is to find the most relevant model for calculating Malaysian firms' cost of equity, particularly for the comparison between systematic and downside risk measures. Apart from adopting some of the models reviewed in Pereiro (2001), this study also proposes a two-factor CAPM model and a downside version that capture both local and global risk factors, which might be more suitable for partially integrated markets such as that of Malaysia.

Overall, our results are consistent with Estrada's findings, which support downside risk measures over standard risk measures. Results based on AIC, SC, R^2, adjusted R^2 and Log Likelihood criteria show that semi-deviation has the highest rank in terms of explanatory power for actual stock returns. In addition, the results also show that models that consider both local and global risk factors have higher explanatory power than models that consider only one kind of risk factor. It is also obvious that the use of different models would result in different values of cost of equity, especially in cases when unsystematic risk is included in estimating risk. For example, the cost of equity calculated based on total risk and semi-deviation has an average value of 36.72% and 26.49%, respectively, while the cost of equity obtained via various systematic risk models has an average value of less than 14%. The difference of at least 16% could be due to unsystematic risks. Given that semi-deviation has higher explanatory power for the variability of stock returns than the other risk measures, investors would have underestimated Malaysian firms' cost of equity if they had used standard CAPM models. Most importantly, the results show that unsystematic risks, that is, firm-specific risks, may have increased in recent years.[4]

[4] To support this argument, we have calculated a firm's unsystematic risk based on the following equation: $\sigma^2_{ei,t} = \sigma^2_{i,t} - [\beta^2_{i,t}(\sigma^2_{M,t})]$. We proxy the risk measure from CAPM and GCAPM and found a consistent uptrend in a firm’s unsystematic risk since 2004. The results are not reported, as the focus of the paper is on a firm’s cost of equity.

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