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Risk Factors in the Sri Lankan Capital Market

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Abstract

This paper examines whether additional risk factors such as the variance, skewness and coskewness of returns offer an appropriate explanation of company returns in the Sri Lankan Capital Market. Arguments for considering these risk factors in pricing models to better deal with the characteristics of a smaller developing capital market are presented. Using individual company returns, empirical tests examine whether the extra risk factors offer a significant explanation of the cross section of returns. Results indicate that while CAPM betas offer little explanation of company returns, variance and, to a lesser extent, skewness are significantly related to returns in this market. Coskewness has little importance. Robustness tests confirm that these measures are unrelated to company size.

Keywords: *Alternative risk measures; Sri Lankan stock market, Developing capital markets*

1. Introduction

The purpose of this paper is to explore the extent to which risk factors such as the variance, skewness and coskewness of returns can provide an explanation of the risk reward relationship in the Sri Lankan Capital Market, in competition with the Capital Asset Pricing Model (CAPM) betas. Smaller developing capital markets are characterized by various features which impact on the risk reward relationship and which may not be captured by the CAPM.

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The CAPM continues to be the most widely used model for determining required rates of return for equity investments, and the cost of capital for investment proposals in most countries. However, some of the assumptions underlying the CAPM may be less applicable to smaller developing capital markets. A key assumption underlying the CAPM is that investors will hold a market portfolio of risky assets. Based on this assumption, the CAPM proposes that the market will compensate investors for bearing market risk[1]. However, this may be less likely in smaller developing

markets, where typically a small number of shares dominate the market. Investors may only be prepared to include this small number of shares in their portfolios, as they will have concerns regarding the marketability of most other shares quoted on these markets. This could result in a reduction in overall levels of diversification. Further, closely held companies are more likely to be a feature of less developed capital markets, and there again may be concerns regarding their marketability. If concerns regarding marketability are a feature of a market, there will be a tendency for investment portfolios to be concentrated in a limited number of liquid assets, giving rise to the presence of unsystematic risk[2] . In this situation investors will be concerned about both market risk and unsystematic risk.

Also, if there are a significant number of shares that attract little institutional interest, it is reasonable to assume that individual shareholders will dominate the overall total shareholding of these companies. These shareholders are more likely to have undiversified portfolios, and they should be concerned about total risk rather than just systematic risk. It is appropriate therefore to address the question as to whether the inclusion of other explanatory factors may provide a better description of returns. In other words, if these other risks remain present in a market, an interesting investigation is whether investors will be rewarded for any exposure to them. These factors may also assist in the development of a more complete measure of risk for individual investments.

In developed markets, most derivatives are useful for hedging systematic risk, or for the management of capital budgeting risk. They may however also be less frequently used by portfolio managers as a hedging instrument, to reduce exposure to unsystematic risk. For this to be successful, it is clearly necessary that there be an active market in options and futures. If an active derivative market is not available, portfolio managers may not be able to eliminate their exposure to unsystematic risk. Clearly, it is difficult either to construct, or to price appropriate derivatives, in the absence of an active market. Risk levels associated with all shares, including those that are actively traded and attract investor interest, may therefore be greater than the levels indicated only by a measure of systematic risk.

A further assumption in the CAPM is that asset returns will be normally distributed. However, there is evidence that skewness is important in developing markets. Bekaert, Erb, Harvey, and Viskanta (1998) report that emerging market equity index return distributions are highly non-normal, in comparison with market returns in developed markets. In particular, they identify significant skewness and kurtosis in emerging market returns, and they observe the persistence of skewness over time. They suggest that investors will have a preference for positively skewed investments, and will wish to avoid negatively skewed distributions. It is reasonable therefore to expect that the skewness of returns will play a role in explaining the cross section of company returns. Given this evidence, we expect that models which include skewness may be more relevant for developing markets, because of the characteristics of these markets. When asset returns are asymmetric, investors would factor in the skewness of the distribution

[1] This is confirmed by survey results carried out in the U.S. (Brunner, Eades, Harris, and Higgins, 1998; Graham and Harvey, 2001) and in a survey of Asian and Australian companies (Kester, Chang, Echanis, Haikal, Isa, Skully, Tsui, and Wang, 1999)

[2] Following a survey of the main characteristics of emerging markets, Feldman and Kumar (1995) note the lack of liquidity of all but a small proportion of actively traded stocks, in a large number of these markets.

of returns when assessing risk return tradeoffs. In such a context, variations of the Kraus and Litzenberger (1976) three-moment CAPM may offer a more appropriate asset-pricing model. These models accommodate a reward for co-skewness of asset returns with the market portfolio, as well as covariance risk.

There is a very considerable literature examining the impact of idiosyncratic risk on company returns, in developed markets and in emerging markets. Bookstaber and McDonald (1987) and Affleck-Graves and McDonald (1989) demonstrate that daily and weekly index returns exhibit skewness. Badrinath and Chatterjee (1988) account for both skewness and kurtosis in their examination of market index returns. Singleton and Wingender (1986) and others examine the persistence of skewness over time. French, Schwert, and Stambaugh (1987) test whether the market risk premium is related to risk, as measured by market volatility. Using daily returns, they find a strong relationship with the unpredictable component of volatility. Goyal and Santa-Clara (2003) demonstrate that an average measure of variance of individual equity returns is related to overall market performance. Xu and Malkiel (2003) adapt an alternative approach. Using the three factor model, they decompose total volatility of individual shares into its systematic and idiosyncratic components. They propose that there are factors causing individual investors not to hold fully diversified portfolios, so that they will be concerned about this specific risk. They show that idiosyncratic volatility appears to have increased over time. In a further study (Malkiel and Xu, 2006), they demonstrate that this measure of volatility is useful in explaining individual company expected returns. Harvey and Siddique (2000) report that co-skewness can explain the cross sectional variation of returns in US stocks. Barone Adesi, Gagliardini, and Urga (2004) investigate the presence of coskewness with market returns, in portfolios of companies that are relatively large or relatively small. Ang, Chen, and Xing (2006) also account for an element of coskewness, when testing for a relationship between the cross-section of share returns and down-side risk.

We therefore apply measures of unsystematic risk as supplementary risk factors to the Capital Asset Pricing Model, to test if they offer a better explanation of company returns in the Sri Lankan market. Measures of variance, skewness, and of coskewness with the market index are considered. We employ daily data for individual equities quoted on the Colombo Stock Exchange. This will facilitate as assessment of whether any other commonly used measures of risk tend to be priced in this market. The search for the form and specification of an asset pricing model that offers an appropriate explanation of the risk return relationship, whether in developed markets or in emerging markets, is still continuing. An investigation of variance, skewness, and of coskewness as candidates for risk factors in an asset pricing model in the context of the Sri Lankan market or other markets in the region has not been undertaken so far, to the best of our knowledge. This study will therefore make a useful contribution to the ongoing search for an appropriate asset pricing model relevant to the Sri Lankan market.

The results of the study show that these idiosyncratic measures of risk are significantly related to returns. When used in combination with beta, as extensions to the CAPM, we find evidence of the continued importance of unsystematic risk, and of skewness of returns. Coskewness with market returns appears to be less important. The rest of the paper proceeds as follows: Section 2 presents outline data from the developing equity markets under investigation. All markets are located in the Pacific Basin region. Section 3 outlines the methodology. Section 4

provides an analysis of results from tests of the power of individual risk measures, and Section 5 contains an assessment of the contribution of these measures when in combination with beta. Section 6 presents robustness checks, to determine if any risk measures may be capturing size or market to book factors, and Section 7 concludes the paper.

2. Data

Daily prices for the largest 100 firms in this market are gathered over the period from June 1st 2003 to May 31st 2007, and dividend adjusted daily returns are calculated. Market capitalization is taken as the measure of company value, and annual values also are gathered for all firms. The Sri Lanka daily inter-bank rate provides the estimate of short-term interest rates. The market index is the Sri Lanka DS Market Index, prepared by Datastream. It has been constructed as an index estimate of dividend adjusted market returns. This index is designated as a 'return index[3]. The DS index is value weighted, and covers a minimum of seventy-five percent of total market value. Company value and availability of data determines inclusion in an index, and the largest value companies in each market are selected. All data used in this study comes from Thompson Datastream database.

Table 1 presents outline summary information on the market. Values are from June 1st 2003, the earliest date from which data has been gathered. Market capitalization of all listed companies provides the measure of total market value. Total market values, and also average and median company market values, are detailed in the local currency and in US $s, using currency exchange rates at the same date.

Table 1: Market Outline Details

No. of Companies	240
Total Market Value:	
Local Currency, Millions	202,947
US $, Millions	2,087
Average Co. Mkt. Value:	
Local Currency, Millions	845
US $, Millions	8.69
Median Co. Mkt. Value:	
Local Currency, Millions	238
US $, Millions	2.45
Top 100, % of Tot. Mkt. Value	91.7

Notes: *All amounts and values are as on June 1st. 2003. Values are expressed in Sri Lankan Rupees. US $ values are estimated, using the appropriate exchange rate on June 1st 2003.*

[1] Details on the construction of DS (Datastream) Indices are available in 'The Datastream Global Equity Indices User Guide, Thompson Financial Limited 2003. The return index represents the theoretical growth in value of a notional stock holding, the price of which is that of the selected price index. This holding is deemed to return a daily dividend, which is used to purchase new units of the stock at the current price. The gross dividend is used. Full details on the construction of DS return indices are available in the user guide (page 20).

The Sri Lanka stock market is a relatively small market in the Asian region. Median company values also are considerably small. The largest 100 firms represent a large proportion of the total market value.

Because beta values and other risk measures will vary depending on the time horizon over which they are estimated, and also because true company risk exposures will alter over time, the approach of Kothari, Shanken and Sloan (1995) is adapted. Risk measures are estimated over a twelve- month horizon, using daily observations. Further, because of the large number of small thinly traded shares in developing markets, the study population is restricted to the largest 100 firms in the market. This restriction should reduce the influence of very small companies, and should therefore curtail the impact of excessive non-synchronous trading on the estimated risk measures. As indicated in Table 1, the largest 100 firms represent a very sizable proportion of total market value. They will also be the firms that are of most interest to the vast majority of investors.

To identify the largest 100 firms, all firms have been ranked by total market capitalization, and the top 100 have been selected. Recorded values at the start of the study period, June 1st 2003, are used. However, the use of market values at the start of the study period as the selection method may cause bias, as the selected firms may not remain the top 100 in the market. The group will include firms that perform well, and perform badly, over the study period. Some firms may do poorly and fall out of this group. Other firms may perform strongly, and thus should be included. Some firms may de-list. Newly listed firms may also gain a significant presence in the market, during the three year period. As a robustness check, we therefore also select the largest 100 firms, using recorded market values on the last study date, May 31st 2006. All tests described in the latter parts of this paper were replicated using these second selections of the largest 100 firms. Estimated input values and test results are largely unaffected[4].

3. Methodology

The cross-sectional relationship between risk and return is under investigation because the CAPM implies that shares with high beta values in a particular period will experience high average returns over the same period. A model that includes other alternative measures of risk therefore implies a pattern between average company returns and sensitivity to these risk measures over the same period. As a result, all risk measures employed in this study are initially estimated over the same one year period as average daily company returns. To test whether measures of variance, skewness, and coskewness might offer an improved explanation of company returns, individual estimates are prepared for the largest 100 companies in the market. Estimates are prepared on an annual basis, for 2003/2004, 2004/2005, and 2005/2006, using individual daily market returns for each company. A further stage in the investigation requires that these estimated risk measures are then regressed on average company returns.

[4] These results are available from the authors

Annual values of beta also are estimated for each company. Although we limit our study to the largest 100 firms in the market, thin trading may still distort many of the beta estimates. In Table 2, we report the number of days with zero returns in each year, averaged across the 100 firms. Lesmond, Ogden, and Trczinka (1999) propose this statistic as a measure of transaction costs, but it should also provide an approximation of the extent of thin trading. As could be expected, the incidence of zero returns is high in Sri Lanka. As thin trading may distort beta estimates of these firms, the Dimson (1979) adjustment for thin trading is applied in all cases. All average input values in the second pass regressions are presented in Table 2. Cross-correlations between individual risk parameters are also reported in each year. They are in Panel B.

Table 2: Initial Results, Annual Data.

Panel A: Average Input Values.

	Company Returns[a]	Zero Returns	Beta	Variance[b]	Skewness	Coskewness[c]
03/04	0.3835	0.4862	0.7813	0.2439	-0.3467	-5.7691
04/05	0.8957	0.5116	0.7812	0.1257	0.7297	-0.0474
05/06	0.4252	0.4651	0.9884	0.1358	-0.5132	-1.0002
06/07	0.3394					

Notes: All values are from the top 100 companies, determined at the start of the study period. The Dimson (1979) adjustment for thin trading has been applied, when estimating all beta values. Under the heading 'zero returns', we also present the average proportion of zero daily returns recorded in each year.

[a] Average daily returns are ($x10^3$)

[b] Average variance values are ($x10^2$)

[c] Average coskewness values are ($x10^3$)

Panel B: Cross Correlations between Risk Parameters.

		Variance	Skewness	Coskewness
03/04	Beta	-0.064	0.153	-0.109
	Variance		0.041	-0.039
	Skewness			0.004
04/05	Beta	0.020	0.095	0.081
	Variance		0.116	0.103
	Skewness			-0.077
05/06	Beta	-0.012	-0.094	0.198
	Variance		-0.011	0.055
	Skewness			-0.018

Notes: All cross correlations are between estimated risk parameters of individual companies, in each twelve-month period.

We do not contemporaneously estimate the CAPM model with additional risk parameters. Had they been included in the initial estimation, there may have been an impact on the beta estimates, should any of these alternative parameters capture an element of systematic risk. In the event of this occurring, beta estimates may become less representative of the true beta values. As the research question under investigation is whether additional risk parameters are priced in the Sri Lankan market, after allowing for beta, it is more appropriate that all risk parameters, including beta, are initially estimated. Generally known as 'Market Model betas', these estimates should be more comparable with previous studies on systematic risk. Further, when preparing the beta estimates, a decision to use portfolios of firms rather than individual firms may reduce the possibility of estimation error. However, this would have significantly reduced the number of observations available for the cross sectional regressions, reducing the power of the tests. Given the limited number of firms with regular trading data in a developing market, making this choice was an unavoidable trade-off.

Second pass regressions will offer an indication of whether any of these estimates of risk offer a significant explanation of company returns. To do this, measures of average annual daily returns for each company are regressed on the different measures of risk, estimated over the same twelve month period. By focusing on risk measures that are measured contemporaneously with returns, an implicit assumption that risk exposures remain constant is not required. If earlier period risk parameters are weak predictors of current values, a regression on parameters from a previous period would have reduced power. However, endogeneity may be present when there is a contemporaneous regression of annual returns on the risk parameters, as a particularly high return will impact on variance, skewness, and coskewness of the same stock in the same period. We therefore report two separate sets of second pass regression coefficients, one from a regression of average returns on the contemporary risk parameters, and one from a regression of average returns on risk parameters from the previous period. Average company returns for the 2006/2007 period are therefore required for the final set of lagged regression tests.

An initial simple single regression test offers an indication of whether individual measures are significant. Further testing will require the application of multiple regression tests. They will offer evidence of whether a combination of measures will provide a fuller explanation of company returns. A series of alternative models are tested.

Model 1 is a test of the cross sectional explanatory power of market model betas in competition with the variance of returns:

$$R_i = \alpha + b_1 Beta_i + b_2 Variance_i + e_i \quad (3.1)$$

Model 2 is a test of the cross sectional explanatory power of market model betas in competition with the skewness of returns:

$$R_i = \alpha + b_1 Beta_i + b_3 Skewness_i + e_i \quad (3.2)$$

Model 3 is a test of the cross sectional explanatory power of market model betas in competition with coskewness of returns:

$$R_i = \alpha + b_1 Beta_i + b_4 Coskewness_i + e_i \quad (3.3)$$

Model 4 is a test of the cross sectional explanatory power of market model betas in competition with both the variance of returns and the skewness of returns:

$$R_i = \alpha + b_1 Beta_i + b_2 Variance_i + b_3 Skewness_i + e_i \quad (3.4)$$

Model 5 is a test of the cross sectional explanatory power of market model betas in competition with both the variance of returns and the coskewness of returns:

$$R_i = \alpha + b_1 Beta_i + b_2 Variance_i + b_4 Coskewness_i + e_i \quad (3.5)$$

In Eq. (3.1) to (3.5), Ri represents average daily returns earned by company i, over a twelve month period. All risk measures, Betai, Variancei, Skewnessi, and Coskewnessi, are previously estimated for company i, over either the same period or the previous period. Regression coefficients are b1 to b4, and they may differ in each model. They offer an estimate of sensitivity of company returns to each risk measure. The intercept is ?, and ei is the error term.

4. Initial Results

Initial results provide an indication of the significance of individual measures of risk from the second pass regressions. Regression coefficients are presented in Table 3. In each cell, the top coefficient comes from when risk measures are related to returns in the same period, whereas the lower value comes from when they are lagged, so that they are related to returns in the following period. It is interesting to note that in all study years, Beta values do not offer a significant portrayal of average daily returns. There is one instance when the beta coefficient is significantly negative. This implies an inverse relationship between beta values and company returns, which is contrary to the CAPM prescription.

Table 3 : Single Factor Regression Coefficients.

Year	Beta[a]	Variance	Skewness[b]	Coskewness
03/04	0.543	-0.298**	0.349**	-0.034
	0.029	0.041	0.072*	0.029
04/05	-0.124	-0.177**	0.226**	0.836
	0.658**	-0.054	-0.002	1.879
05/06	-0.045	0.365*	0.076	0.139
	0.3312	-0.455**	0.054	-0.123

Notes : *Risk measures are the independent variables, and average daily return is the dependent variable. All coefficients are estimated from single factor regression models. The upper coefficient in each cell is from a regression of risk measures on company returns in the same year, whereas the lower coefficient comes from a regression of these risk measures on company returns in the following year.*

[a] Beta coefficients are ($x10^3$)

[b] Skewness Coefficients are ($x10^3$)

** and ** indicate statistically significant coefficients, at the 5% and 1% levels, respectively.*

When variance and skewness are each individually regressed on company returns, coefficient values are significant in the majority of cases. The majority of lagged regression coefficients confirm this tendency, particularly in the case of variance. Results indicate that variance may be more strongly related to company returns than beta. Moreover, variance is significantly negatively related with returns in two study years, contrary to expectations. Overall, relationships between risk measures and company returns appear to be unstable in the market.

Results for coskewness also are weak, as average returns are not significantly related to this measure, in any study year. This is not the expected relationship, as previous studies have identified that coskewness is an important explanatory variable for company returns, in most developing markets. It tends to be significantly negatively related with returns, as a positive coefficient tends to occur in the periods when average company returns are negative.. Coskewness with market returns should capture asymmetry in risk, for diversified investors. Investors will prefer portfolios that are right skewed rather than left skewed. Company returns that are left skewed will therefore be less desirable to portfolio managers, and must therefore offer a greater average annual return.

In conclusion, the evidence indicates that no individual measure of risk offers a consistent explanation of average daily company returns over a one year horizon. The largest 100 firms in this market are likely to include a very sizable proportion of firms that are thinly traded to such an extent that the measures of risk examined in this study are less meaningful.

5. Combined Measures of Risk

In a second series of tests, we now ascertain whether any of the alternative risk measures are significant, when in combination with beta. To examine this question, we initially introduce a single alternative risk measure into the regression tests. Separate multiple regression estimates evaluate the importance of variance, of skewness, and of coskewness, as the second independent explanatory variable. They are designated as Model 1, Model 2, and Model 3 respectively. In each case, beta remains the other explanatory variable. Estimates are presented in Table 4. As in the previous table, the top coefficient in each cell is from when risk measures are regressed on returns in the same period, whereas the lower value comes from when they are lagged, so that they are related to returns in the following period.

Table 4 : Two Factor Model Regression Coefficients

	Model 1		Model 2		Model 3	
Year	Betaa	Variance	Betaa	Skewnessb	Betaa	Coskewness
03/04	0.056	-0.301**	0.637	0.353**	1.192	0.087
	0.121	0.046	0.009	0.072**	1.022*	0.158*
04/05	0.082	-0.175**	0.177	0.233**	0.094	0.580
	-0.648**	-0.043	-0.695**	-0.028	-0.654**	0.065
05/06	-0.359	0.455**	-0.210	0.091*	-0.223	0.252
	0.779**	-0.651**	0.328	0.061	0.429	0.092

Notes : *All coefficients are estimated from two factor regression models. In all cases, average daily returns is the dependent variable. For Model 1, the independent variables are company beta and variance of company returns. For Model 2, the independent variables are company beta and skewness of company returns. For Model 3, the independent variables are company beta and coskewness of company returns. The upper coefficient in each cell is from a regression of risk measures on company returns in the same year, whereas the lower coefficient comes from a regression of these risk measures on company returns in the following year.*

[a] Beta coefficients are (x103)

[b] Skewness Coefficients are (x103)

** and ** indicate statistically significant coefficients, at the 5% and 1% levels, respectively.*

If Model 1 is considered, the importance of variance is clear. In most years, it remains significantly related to company returns. However, the relationship between returns and variance is in an unexpected direction, in two study years. The fact that variance clearly dominates beta, when offering an explanation of returns is noteworthy.

In Model 2, skewness becomes the second independent variable. Skewness is significantly related to company returns in all study years, whereas beta only is related to 04/05 lagged returns.

A final two factor model combines beta with coskewness of returns, to test their combined significance in explaining company returns. Results indicate that it offers little explanation for company returns in Sri Lanka.

In a final series of models tested, two alternative measures are included with beta in the second pass regressions. Designated as Models 4 and 5, they combine beta and variance with either skewness or coskewness, as the final measure of risk. Variance has been selected as an explanatory variable in each model, because initial single factor regression tests clearly identify it as the single most important risk measure. Estimated coefficients are presented in Table 5. Results confirm the relative instability and therefore the lack of importance of beta in explaining returns in Sri Lanka. As previously noted, the largest 100 firms probably include a considerable proportion of thinly traded examples. Also, lagged regression coefficients are also unstable. This is not unexpected.

Table 5 : Three Factor Model Regression Coefficients

	Model 4				Model 5	
Year	Betaa	Variance	Betaa	Skewnessb	Betaa	Coskewness
03/04	0.109	-0.261**	0.328**	0.401	-0.298**	0.061
	0.086	0.037	0.068*	0.925	0.028	-0.153*
04/05	0.182	-0.101*	0.218**	0.024	-0.192**	1.933
	-0.692**	-0.055	-0.036	-0.626*	-0.046	0.391
05/06	-0.483*	0.431**	0.076	-0.155	0.443**	0.183
	0.772**	-0.642**	0.037	0.862*	-0.458**	0.137

Notes : *All coefficients are estimated from three factor regression models. In all cases average daily returns is the dependent variable. For Model 4, the independent variables are company beta, variance of company returns, and skewness of company returns. For Model 5, the independent variables are company beta, variance of company returns, and coskewness of company returns. The upper coefficient in each cell is from a regression of risk measures on company returns in the same year, whereas the lower coefficient comes from a regression of these risk measures on company returns in the following year.*

a Beta coefficients are (x103)

b Skewness Coefficients are (x103)

** and ** indicate statistically significant coefficients, at the 5% and 1% levels, respectively.*

Model 5 provides an indication of the importance of coskewness, when combined with both beta and variance. Its lack of significance in the Sri Lanka market can be observed in the earlier one factor and two factor tests. Overall, results from this final model indicate little evidence that coskewness is related to company returns.

6. Robustness Tests

In a series of tests on explanatory factors that may be related to the cross-section of returns in emerging stock markets, Rouwenhorst (1999) includes an evaluation of the importance of company size, and of the book to market ratio. Using average monthly returns, he reports evidence of a size premium in a few individual countries. He also finds that, in some markets, shares with high book to market ratios offer significantly higher returns. It is possible therefore that the idiosyncratic risk measures under evaluation in this study could be capturing either a size factor or a book to market factor. As a robustness check, we therefore investigate this possibility.

Annual total market values are gathered for all companies in the study population. Values are taken on June 1st, to coincide with the beginning of each twelve - month period that is under investigation. Annual company market values are regressed on each individual risk measure, to test for evidence of a significant relationship. Market values are taken on a single date, whereas all risk measures are estimated over a twelve-month period. In each regression test, a start of period value for company size is regressed on each risk measure. To control for potential error, end of period values of these factors are also regressed on each risk measure. Test results are very similar to those described below[5] . A robustness check on market to book

factors in the Sri Lankan market was not possible, as ratios are only available for a relatively small proportion of the largest 100 firms in this market. All market values come from Datastream. Results of the regression tests are in Table 6.

Table 6 : Robustness Tests, Regression Coefficients.

	Size is Independent Variable		
Year	Variancea	Skewnessb	Coskewnessc
03/04	-0.015	0.031	0.018
04/05	-0.039	-0.084	-0.156
05/06	-0.191*	0.159	-0.006

Notes : Company size on the start date of each study period is the independent variable. Each individual estimated risk measure is the dependent variable. All coefficients are estimated from single factor regression models.
a Variance Coefficients are (x10-7)
b Skewness Coefficients are (x10-3)
c Coskewness Coefficients are (x10-8)
** and ** indicate statistically significant coefficients, at the 5% and 1% levels, respectively.*

We investigate whether the size factor is captured by any individual risk measure. Results offer little indications of a relationship. We find one marginally significant coefficients for variance; however this is negative, which is not the expected relationship.

7. Conclusions

In the Sri Lankan market beta tends not to be priced. Coskewness also is not related to company returns in this market. Multiple regression results provide greater evidence of the importance of alternative risk measures. When beta is combined with other measures of risk, it does not dominate. When beta is combined with either variance or skewness; the second measure of risk remains significant. This result remains, regardless of the time period under investigation.

When both variance and skewness are included with beta as independent variables, multiple regression results indicate that both remain significantly related to company returns. This is a stronger result, and an arguable implication is that other measures of risk should also be used, when attempting to determine cost of equity capital in this market. Pricing of shares and levels of return tend to be significantly related to both variance and skewness of returns, so these measures probably are important in determining expected levels of return.

The remaining measure is coskewness, which does not offer a significant relationship with returns. This differs from previously reported research findings on large developed markets

[5] This set of results is available from the authors

which suggest that coskewness will have consistently strong explanatory power. Robustness checks provide relatively little indication that a size factor is related to the risk measures.

In conclusion, there is some evidence that, besides beta, other measures of risk are important. Variance offers a significant explanation of returns. This may be because investors are not fully diversified, and therefore continue to be exposed to unsystematic risk. The results also indicate that skewness remains significantly related to company returns. A likely explanation for the observed importance of skewness of returns is that institutional investors such as pension funds and insurance companies are increasingly concerned about 'downside risk', that is variability of returns below a specified target return. Negative skewness in returns would impact on downside risk, and therefore one would expect skewness to be important in asset pricing.

The evidence also indicates that coskewness with market returns is less important than unconditional skewness. It is possible that many investors do not have fully diversified portfolios, so that coskewness is of relatively less importance to them.

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