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**VOLATILITY IN THE COLOMBO STOCK EXCHANGE MARKET : AN ESTIMATION OF BETAS**

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**Introduction**

In recent times, the most fruitful theory of stock exchange markets, and financial asset markets generally, has been the Capital Asset Pricing Model (CAPM) advanced by William Sharpe<sup>1</sup> and developed generally to what is referred to as the Sharpe-Lintner- Mossin model.<sup>2</sup> The model is based on the insights of earlier writers who attempted to simplify the consideration of the behaviour of the stocks in a stock exchange market into a few statistical quantities as mean - variance, which was the first major breakthrough in the field. In Sharpe's model, for every security active in the market, there can be associated a "beta" value and a separation of the risk (variation) to systematic and unsystematic parts.

In practical use, a beta value of one indicates movement identical with the market and below one underperformance and over one over performance. The relative part of risk which is systematic is that part which is due to the market as a whole (the system). Therefore in market use, the systematic part is that part of the risk of a security which cannot be diversified away. It may be observed that for the purposes of market use by fund managers and portfolio investors a knowledge of these values would be useful, if not indispensable. A look at current texts in corporate finance and advanced accounting, especially capital budgeting, will reveal that company betas have become an indispensable tool in these areas too.

As these values are not available for the Sri Lanka market, the material of this study may be generally useful. However, we have applied the CAPM model to the Sri Lanka Stock Exchange market for the elucidation of characteristics of the market which may clear the air about appropriate policies for the market.

**Volatility**

It has been felt that the Sri Lanka market is a volatile one and also subject to features such as manipulation and insider dealing. Therefore extensive measures have been proposed and partially adopted to counter these perceived weaknesses. Indeed at first glance, considering the size of price variation which does occur in many stocks, it does appear that it is unsafely volatile. Further it is again clear at first glance that the market is substantially rumour driven and price changes uncorrelated to current events in many cases. One may well accept that insider manipulation is rife.

However, first glances can be misleading and in this case contain a common fallacy. Although a particular share may display considerable variation, from the view point of

the market investor, or the portfolio viewpoint, it is necessary to distinguish individual variation from systematic or whole market variation. If the market as a whole is efficient and a good one, it will show variation due to changes in the real world of economic and national changes. Therefore it is necessary to consider the volatility of shares abstracting the market-wide component.

Within the Sharpe CAPM model the normal estimate of volatility of a security is its beta taking one as the non-volatile value. Further as the method of taking risk out of investment is diversification, the undiversifiable or systematic part is a further indication of the risk in terms of volatility in the market.

In Sri Lanka, there is a regular and continuous Stock Exchange now which has built up a good volume. However a particular share need not trade every day nor with any discernible pattern of trading days. As the market is available regularly, we have adopted the convention that when there is a price change it should be attributed to the day of change and not evened out over the period. With this consideration, the CAPM model was applied to the market as follows.

### **Empirical Work**

It was decided to take a period of time which would provide sufficient observations for the normal statistical tests to be applied. Further it was decided to take a period after the time when the Stock Exchange was fully established and trading with a wide range of participants. Months covering the full year were taken and these include a match of slow and heavy months. A time when regulatory changes disrupted the market was excluded. The time period was selected prior to data examination using only guidelines from the general economy and the known seasonalities of the market. The period was 9 Sept'88 to 30 Dec'88, 5 Jan'90 to 30 March'90 and 1 June'90 to 28 Sept'90. A total of 47 weeks were available. The weekly average price was taken.

The stock exchange share list includes a disturbing range of shares from completely inactive to daily traded and from ones held by fewer than twenty persons to those held by 17,000. The shares also range through the spectrum of economic activity. Further in this period, a substantial sector, nearly half of all listings, the hotels sector, was in an unusual and inactive state. Therefore a certain judgement from experience was needed to assemble a set of shares which may be considered a representative sample of shares which may have been considered during this period to have been of portfolio investment quality. In any case the inactive shares were of no use for statistical work. There is no doubt that other samples could have been taken. However the sample was arrived at on the above criterion prior to looking at the data and not changed after encountering the data. It is believed that the sample is a fair and representative one and numbered 32 companies.

The matter of a market index was a more serious problem. The Stock Exchange Market Index for all shares was finally taken. However it is the opinion of the authors that a better index in terms of coverage and method of computation would be useful.

For each company, observation pairs of return on the security and return on market index for identical times were taken. Return taken was the price change of the share. There were no bonus shares that had to be included. Where dividends were concerned, instead of calculating the dividend period separately, as the share prices seemed to reflect the income fully, the price effect alone was taken. Using the data the beta was calculated by the variances formula ( $\text{Cov } i, M / \text{var } M$ ) and also by the equivalent estimation of the following by OLS. The R squared estimate was used for systematic risk. The statistics were also calculated to determine the significance of betas at .05.

$$R_i = \alpha + \beta R_m + E, \text{ (ith security, market } M, \text{ Return } R)$$

Table 1 provides the results.

**Table 1 : Data Source for Calculations:Colombo Stock Exchange, Daily Report**

Company	Beta	Systematic Risk %	T Statistic for Beta	T Statistic @ 0.05 Significance
1. Ceylon Tobacco	2.414	62.40%	7.726	1.697
2. Galadari Hotels	2.205	36.10%	3.530	1.714
3. Kelani Cables	1.786	60.20%	4.760	1.753
4. Bata	1.682	55.70%	6.541	1.697
5. East West Property	1.546	6.90%	1.089	1.746
6. Seylan Bank	1.461	34.50%	3.476	1.711
7. Haycarb	1.234	42.30%	5.204	1.097
8. Commercial Bank	1.227	39.70%	4.865	1.697
9. Lankem (Cey)	0.957	6.20%	1.404	1.697
10. Aitken Spence	0.921	19.70%	3.058	1.697
11. Hatton National Bank	0.914	23.80%	2.903	1.703
12. Shaw Wallace & Hedges	0.879	13.20%	3.654	1.697
13. Korea Ceylon	0.865	15.30%	2.250	1.701
14. Central Finance	0.776	20.00%	2.645	1.701
15. Chemical Industries Ceylon	0.758	56.70%	7.051	1.697
16. Sampath Bank	0.751	8.37%	2.645	1.697
17. Acme Alluminium	0.735	17.80%	2.323	1.708
18. Ceylinco Insurance	0.674	10.20%	1.655	1.711
19. Singer Sri Lanka	0.671	17.10%	2.646	1.697
20. Nestles'	0.602	39.10%	3.759	1.717

Table 1 Contd.

Company	Beta	Systematic Risk %	T Statistic for Beta	T Statistic @ 0.05 Significance
21. Colombo Land	0.305	3.50%	0.664	1.782
22. Lanka Tiles	0.304	2.76%	5.979	1.708
23. Taj Lanka	0.232	1.20%	0.575	1.703
24. Property Development	0.205	0.80%	0.458	1.706
25. Siedles	0.204	0.20%	0.126	1.833
26. Gilbeys	0.034	0.00%	0.129	2.353
27. John Keels	-0.223	0.60%	-0.316	1.740
28. E.B. Creasy	-0.254	2.10%	0.041	1.782
29. Mercantile Credit	-0.572	2.20%	-0.741	1.711
30. CTC Eagle	-0.752	7.60%	-1.282	1.725
31. Carson Cumberbatch & Co.	-0.953	37.10%	-2.171	1.860
32. Hayleys	-4.754	2.40%	-0.945	1.697

### Results and Conclusions

The immediate result was that the market seems to be much more orderly than given credit for in popular rhetoric. Twenty shares ranged from 0.6 to 2.4 and twenty betas were significant by the t-test. Certain shares which had unusual histories in this time due to takeovers or their own logic owing to general unavailability of those shares were out of step. The property shares as a sector gave poor t-statistics and regression results, probably reflecting the unusual nature of that sector at this time.

There were 9 shares which had a systematic risk above 30% (up to 63%) and they were all the very well distributed shares as to shareholders. With one exception, Galadari, they may also be considered shares considered "good" by market professionals.

Eight shares had a systematic risk share of 10 to 30 per cent. These were shares whose distribution amongst shareholders were of the first rank or, in most of the cases, of the second rank to the earlier noted shares. The shares were also what may be considered "good" by market professionals though generally of second rank to the first set noted above.

The twenty shares of beta value above 0.6 included all of the above two sets and also two insignificant (t-statistic) and one low R squared shares. The shares which may be considered "bad" by market professionals did not make it to these sets. The "bad" and erratic shares appeared to have the combination of low or negative betas, relative insignificance and low systematic risk percentage, generally. One may note that the company under takeover, Carsons, had 37.1% R squared, significant beta of 0.953

negative, which is not unusual but shows that the company followed its own logic antithetical to the rest of the market.

These regularities of the results give confidence that the sample and methodology were robust. The specific values of betas and systematic risk will change with other methods and data periods, as indeed well documented in the literature. But the results are remarkably within the sort of results one may expect from a fairly orderly and conservative market in terms of international experience.

The relative upward shift of beta values compared to foreign markets, the nature of the shares in that list and the high values of systematic risk suggest that the good shares are indeed possessed of quite some undiversifiable risk. So the general perception of volatility is not without foundation. However the volatility is not out of line and in fact the spread of betas is conservatively small. It is interesting that one cannot get too far from the market return by investment in well distributed shares considered good by professionals. Other features as the bulk of well distributed financial shares averaging around beta one, the high betas nonetheless being the shares most closely following the market in variation (ie high R squared) are also indicative of an orderly market.

If one may generalise at this stage, the marketplace may be best explained as one where there is either a strong herd instinct or good (informal) information flows. It is in keeping with the relative small size of the trading marketplace. This incidently implies that our exercise does not permit conclusions to be drawn about allegations of manipulation, etc.. Such activity could anyway take place within any market. From the point of view of capital market development however, the fact of a relative orderliness and probable information flow (informal) or herd instinct is an important feature which should be kept in mind. Perhaps the Stock Exchange needs neither incentives nor regulation but business.

## References

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