

# **THE MAURITIUS STOCK EXCHANGE: SECTORAL ANALYSIS, RISK AND RETURN**

*by*

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## **ABSTRACT**

Companies listed on the Mauritius Stock Exchange are classified into seven sectors of the economy, namely Banking & Insurance, Industry, Investments, Sugar, Commerce, Leisure & Hotels and Transport. Significant improvements in market capitalisation and turnover are noted in all sectors except the Transport sector. Liquidity in each sector remains fairly low, with the Banking & Insurance sector showing comparatively better liquidity. Steps taken to improve market liquidity are also reviewed. The monthly return for a sample of companies is investigated and found to be reasonably high but so is the standard deviation of return. Most companies in the sample show betas that are statistically significant at the 5 per cent level. The correlation of return is also investigated and found to be highly positive for the blue chip companies and for companies operating in the same sector.

**Keywords:** Mauritius Stock Exchange, Return, Standard Deviation, Beta  
**Running Title:** The Mauritius Stock Exchange

## INTRODUCTION

The Mauritius Stock Exchange has been in operation for slightly more than ten years. On the official market at December 1998, there were 42 companies listed with a market capitalisation of 45.3 billion rupees and on the Over The Counter (OTC) market there were 61 companies. Trading on the official market started in July 1989, with five listed companies and a market capitalisation of 1.4 billion rupees. The trading frequency on the official market has increased progressively from twice weekly to three times weekly in January 1994 before moving to daily trading in November 1997. The Stock Exchange is run and managed by the Stock Exchange of Mauritius (SEM) Limited and it is supervised and regulated by the Stock Exchange Commission (SEC) Limited under the Stock Exchange Act 1988. The SEMDEX is the index of all listed shares. It is a weighted-index and each stock is weighted according to the value of its shares in the total market capitalisation.

Companies listed on the exchange are classified into seven main sectors of the economy which are namely, Banks & Insurance, Industry, Investments, Sugar, Commerce, Leisure & Hotels and Transport. The rate of corporate tax paid by listed companies is 25 per cent instead of the normal rate of 35 per cent. In the case of tax incentive companies the rate is 15 per cent instead of the normal rate of 25 per cent. There are eleven stockbroking companies in operation. Trading on the exchange is done by an order-driven system. Orders by clients can be "at best", "limit" or "stop" orders. The brokerage fee claimed by stockbroking companies varies from 0.50 to 0.75 per cent. A Central Depository and Settlement (CDS) system is operational since January 1997 to speed up share transfer and settlement operations. The Listing Rules are also being revised and harmonised with the Listing Rules of countries of the South African Development Community (SADC).

However, since its inception, there has not been no study on the trading performance and progress of each sector and on the risk-return characteristics of the companies listed on the exchange. The focus of this paper is therefore to perform a sectoral analysis of the companies listed on the exchange and to analyse the risk-return characteristics of a large enough sample of companies on the official list. The paper is organised as follows: In Section I a sectoral analysis of market capitalisation and turnover is performed. This is then followed by an assessment of the market liquidity of each sector. Section II investigates the return properties of each company in the sample. In Section III beta estimates are calculated for each share using the Capital Asset Pricing Model (CAPM) and the Market Model. Finally in Section IV, the correlation of the return of the companies are investigated.

Investors rely on financial markets to provide information on the value of financial instruments. This information role is critical as it provides the basis for investment decisions. When an investor buys a share of a public limited company, he/she would want a reasonable return on the investment for the level of risk assumed. In the limit, the share certificate might turn out to be a worthless piece of paper. Given that information is asymmetric between management and the shareholders, the latter are confronted with a problem of adverse selection (buying the share of a mediocre company) and a moral hazard problem (post contractual opportunism by management once they have obtained the money of the shareholders). In order, to mitigate the problem of adverse selection and to discipline managers, financial markets have a crucial role to play. In a stock market therefore, investors would need information such as the average return on a share, the dispersion of return, the standard deviation of return, the beta value of a share, the correlation of return of a share with that of other shares to assess any possible diversification benefits. Investors would need such information to assess the efficiency of the management team in place, to decide on their buy/hold/sell strategy and to re-adjust their portfolio of assets. This information role is critical for an emerging market, particularly if the market is to grow and develop into a mature market.

## **SECTORAL ANALYSIS OF MARKET CAPITALISATION AND TURNOVER**

From Table 1 it can be seen that the years 1993 and 1994 could be considered as the take-off years for the emerging Mauritius Stock Exchange, where almost all sectors recorded a growth rate in turnover of over 100 per cent. In late 1994 the exchange was also opened to foreign investors, following the suspension of the Foreign Exchange Control Act. There was also a significant growth in market capitalisation in all sectors over the same period. With the exception of the Investments, Sugar and Transport sectors all the other sectors over the period 1991 to 1998 witnessed progressive increases in market capitalisation partly due to more companies admitted to the official list and partly due to improvements in the fundamentals of the listed companies. Each sector has recorded an average growth rate in market capitalisation of over 27 per cent per year (except the Transport sector).

**Table 1. Market capitalisation and turnover by sector**

<b>YEAR</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
<b>Banks &amp; Insurance</b>									
No. of companies	2	2	5	5	6	6	6	6	6
Market Capitalisation (Rs M)	1025	1514.2	3877.7	5876.1	8112.7	9552.3	11541.3	14210.1	14230
% Δ in Market Cap		47.7	156.1	51.4	38.1	17.7	20.8	23.1	0.14
Turnover (Rs M)	26.30	65	185.1	309.6	460.6	654.1	809.5	1068.8	932.5
% Δ in Turnover		147.1	184.8	67.26	48.8	42	23.8	32	-12.8
<b>Industry</b>									
No. of companies	4	4	6	7	7	7	7	7	7
Market Capitalisation (Rs M)	443.4	589.2	1777.0	2190.8	1573.2	1719.3	1838.5	2186.4	1952.6
% Δ in Market Cap		32.9	201.6	23.3	-28.2	9.3	6.9	18.9	-10.7
Turnover (Rs M)	9.90	12.2	121	112.6	57.3	82	75.8	125.4	68.2
% Δ in Turnover		23.2	891.8	-6.9	-49.1	43.1	-7.6	65.4	-45.6
<b>Investments</b>									
No. of companies	3	5	7	9	9	10	10	10	10
Market Capitalisation (Rs M)	451.5	619.8	1998.9	4491.4	3420.4	3824	3259.1	3316.1	3154.8
% Δ in Market Cap		37.3	222.5	124.7	-23.8	11.8	-14.8	1.7	-5.1
Turnover (Rs M)	12.60	23.6	133.3	477.9	244.4	173.7	176	140.5	117.6
% Δ in Turnover		87.3	464.8	258.8	-48.9	-28.9	1.3	-20.2	-16.3
<b>Sugar</b>									
No. of Companies	5	5	5	5	5	5	5	5	5
Market Capitalisation (Rs M)	752.9	1341.9	1706.3	3485	2354.3	2866.4	2645.4	3940.5	3136.5
% Δ in Market Cap		78.2	27.2	104.2	-32.4	21.8	-7.7	49.0	-20.4
Turnover (Rs M)	14.25	13.82	30	74.7	42.3	50.4	68.7	81.5	28.7
% Δ in Turnover		-3	117.1	149	-43.4	19.1	36.3	18.6	-64.8

<b>Commerce</b>									
No. of Companies	5	5	5	6	6	7	7	7	7
Market Capitalisation (Rs M)	1577.4	1904.4	37470	9231.0	5513.4	5062.0	7989.7	6124.7	6132.6
% Δ in Market Cap		20.7	96.8	146.4	-40.3	-8.2	21.0	30.5	-23.2
Turnover (Rs M)	17.3	43.65	109	435.1	210.3	221.8	246.3	554.1	213.7
% Δ in Turnover		152.3	149.7	299.2	-51.7	5.5	11	125	-61.4
<b>Leisure &amp; Hotels</b>									
No. of Companies	-	-	1	2	3	4	4	4	4
Market Capitalisation (Rs M)	-	-	1800.3	3351.9	4122.6	8050.8	9971	12107.4	11437.4
% Δ in Market Cap				86.2	23	95.3	23.9	21.4	-5.5
Turnover (Rs M)	-	-	103	92.7	75.7	298.4	485.1	448.8	532.9
% Δ in Turnover				-10	-18.3	294.2	62.6	-7.5	18.7
<b>Transport</b>									
No. of Companies	-	-	-	-	1	1	1	1	1
Market Capitalisation (Rs M)	-	-	-	-	2721.3	2301.9	1555	1585.7	1688.0
% Δ in Market Cap	-	-	-	-		-15.4	-32.4	2.0	6.5
Turnover (Rs M)	-	-	-	-	129.7	67.7	53.1	55.5	18.9
% Δ in Turnover						-47.8	-21.6	4.5	-66.3

The Banks and Insurance sector has the highest market capitalisation followed by the Leisure and Hotels sector. The Banking and Insurance sector has also consistently recorded a positive growth rate in turnover except for the year 1999. The average growth rate in turnover over the period 1991 to 1999 in that sector has been around 66.5 per cent. Even in the year 1995, when the market experienced its first major correction (the SEMDEX lost 129 points) the Banking and Insurance sector still recorded a convincing growth rate in turnover of around 49 per cent. In fact, all the other sectors in the year 1995 experienced drastic reductions in turnover, most of them recorded a decrease in turnover of around 40 to 50 per cent compared to their 1994 levels. The rights issues by several companies in 1995 have also partly adversely affected trading activity on the exchange in that year.

The Transport sector which is represented by Air Mauritius Limited (the national carrier) has recorded significant falls in turnover since its listing in 1995. This is partly attributed to the consistent decline in its share price from 60 rupees in March 1996 to 31 rupees in December 1998. This begs the research question as to whether it was an over-priced initial offer. This analysis is however, beyond the scope of this paper.

During the year 1999 there has been a significant slow down in trading activity where all sectors (with the exception of the Leisure and Hotels sector) experienced significant fall in turnover. The most notable of these has been in the Sugar and Commerce sectors. The Sugar sector has been severely affected by drastic drought conditions prevailing in Mauritius in 1999. In fact the sugar crop harvest fell by 40 per cent. Obviously, this has affected trading activity in that sector on the exchange.

**Table 2.** Trading Frequency

<b>YEAR</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
Banks & Insurance	23.3	27.74	15.87	14.36	46.1	55.25	72.15	45.72
Industry	12.50	10.64	12.03	5.26	3.63	4.18	2.38	4.3
Investments	38.80	37.45	45.47	42.61	24.39	13.8	10.23	17.13
Sugar	9.30	5.85	2.87	3.03	1.43	1.06	0.79	1.68
Commerce	16.16	18.31	10.69	14.3	8.89	8.75	5.09	19.62
Leisure & Hotels	-	-	13.07	5.36	3.1	14.9	8.12	9.78
Transport	-	-	-	-	6.89	1.30	0.96	1.69

The Banks and Insurance sector records the highest trading frequency for most years over the period 1995 to 1998. It is also noted that there has been a consistent improvement in the trading frequency of that sector over the years, except for the year 1998. This has been achieved mainly after the listing of the State Bank of Mauritius (SBM), in 1995. It can be seen that the trading frequency shot up from around 14 per cent in 1994 to 46 per cent in 1995, following the listing of SBM. The other sectors that had high trading frequencies are the Investment sector and the Commerce sector. The Investments sector had the highest trading frequency over the period 1991 to 1994. Over this period investors were being advised to invest in unit trusts in order to hold a diversified portfolio. The lowest trading frequency is recorded in the Sugar and Transport sectors.

**Table 3.** Traded value ratio

<b>YEAR</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
Banks & Insurance	32.70	41.06	27.16	19.85	37.38	40.77	58.97	41.81
Industry	12.31	7.70	17.80	7.25	4.62	5.12	2.53	4.91
Investments	15.69	14.92	19.57	30.73	19.71	10.56	5.88	5.5
Sugar	17.74	8.74	4.40	4.81	3.42	3.14	2.29	3.19
Commerce	21.56	27.60	15.99	24.95	17.05	13.83	8.22	21.69
Leisure & Hotels	-	-	15.11	6.54	4.94	18.55	16.18	17.56
Transport	-	-		-	10.52	4.23	1.77	2.17

A company might have a high trading frequency in terms of numbers of shares traded but in terms of value traded is low and does not contribute much to the market turnover. To complement the traded volume ratio it is equally important to look at the traded value ratio. This ratio is also a measure of liquidity, that is, the ability to buy or sell shares easily without substantially moving prices.

From Table 3 it can be seen that the Banks & Insurance sector shows the highest ratio, followed by the Commerce sector and Leisure & Hotels. A worrying trend is in the Investments sector where the traded value ratio has declined consistently over the period 1995 to 1998. Therefore the shares of the companies operating in the Banks and Insurance sector, the Commerce sector and Leisure and Hotels tend to be the most liquid. For an investor, who wants to invest in most liquid stocks, they represent the sectors to invest.

**Table 4.** Turnover ratio

<b>YEAR</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
Banks & Insurance	2.56	4.29	4.77	5.27	5.68	6.85	7.01	7.52	6.55
Industry	2.23	2.07	6.81	5.14	3.64	4.78	4.12	5.73	3.49
Investments	1.28	3.81	6.67	10.64	7.15	4.54	5.40	4.24	3.73
Sugar	1.89	1.03	1.76	2.14	1.80	1.76	2.60	2.07	0.91
Commerce	1.10	2.29	2.91	4.71	3.81	4.38	4.02	6.94	3.48
Leisure & Hotels	-	-	5.72	2.77	1.84	3.71	4.86	3.71	4.66
Transport	-	-	-	-	4.77	2.94	3.41	3.5	1.11

The turnover ratio (Table 4) indicates the percentage of the total market capitalisation that is being traded, and is a key indicator of market liquidity. The Banks and Insurance sector and the Commerce sector tend to show on average an increasing turnover ratio. However, the turnover ratio remains quite low in all sectors and even worsening in some sectors. In fact, the Mauritius Stock Exchange is still seriously plagued with low liquidity for quite a few years. Several factors could account for that.

- The trading frequency was twice weekly and increased to thrice weekly in January 1994. It was not until November 1997 that the exchange move to daily trading. Even then stockbrokers can only put deals through at the time trading is conducted.
- The major correction in the SEMDEX in 1995 has driven away many of the small investors. Moreover, the expectation that the public will show much interest in the stock exchange as another avenue to place their savings has not significantly materialise. Bank deposits and government paper hitherto remain the preferred savings instruments.
- It has also been alleged that companies listed on the exchange are much more interested in the reductions in corporate tax that a listing entails rather than the long-term development of the securities market.

Several measures are being taken to try to improve the market liquidity. These are:

- Pension funds are being encouraged to invest their surplus cash in equity rather than in government paper.
- In August 1994, the market has been opened to foreign investors. They are allowed to invest freely on the official market provided the acquisition of shares is not aimed at acquiring a controlling interest and they can only have a maxi-

num of 15 per cent of the voting rights of a company in the sugar sector. Foreign investment, on average, accounts for around 30 to 35 per cent of market turno very which is quite a significant share.

The exchange is considering moving to fully automated trading where market participants will be able to trade round the clock. However, given the large initial outlay involved, the feasibility of computer trading is being carefully studied.

### RETURN CHARACTERISTICS

Information on the maximum return, the minimum return, the mean monthly return and the standard deviation of return are calculated for a random sample of companies over two different time periods. The first covers the time period March 1991 to December 1994 and includes a sample of 12 companies and the second period is from March 1995 to December 1998 and includes a sample of 19 companies. It was necessary to consider two time periods as many companies became listed towards the end of 1994 and the beginning of 1995. The results for the first period are reported in Table 5.

**Table 5.** Return and standard deviation of return

Year 1991 M3 to 1994 M12				
Return (%)				
Company	Max	Min	Monthly Mean	Std Deviation
GIDC	40.5	-11.8	3.2	10.3
HF	46.6	-12.6	1.7	9.8
HM	45.9	-51.3	2.0	14.5
MCB	26.7	-10.4	2.9	7.0
MCFI	37.2	-26.1	1.5	9.8
MDA	49.4	-13.0	2.4	10.4
MDIT	33.7	-28.6	1.5	9.9
MONT	38.8	-11.7	1.5	8.1
MTMD	23.3	-22.3	1.6	8.5
RM (SEMDEX)	16.3	-3.60	2.4	4.5
ROGR	25.5	-6.30	3.1	6.3
SAVA	48.0	-9.20	3.7	11.7
UBP	45.1	-13.2	2.3	9.9

(Source: Author's computations)

It can be seen from Table 5 that the dispersion of return is quite high and that the mean monthly return ranges from 1.5 to 3.7 per cent over the period March 1991 to December 1994. The return properties of emerging markets have been investigated by a number of authors such as Divecha *et al.* (1992), Wilcox (1992), Harvey (1995) and Claessens *et al.* (1995). The data bears with the empirical evidence that the Mauritius stock market, like other emerging markets, offers the prospects of high return. However, the standard deviation of return over this period was also high compared to the mean monthly return. Casual observation also tends to show that for most of the cases, a higher mean return is also associated with a higher standard deviation. Surprisingly however, the volatility of return though high, is not as high as in other emerging markets. For instance, Harvey (1995) reported that the volatility of return is quite high for emerging markets ranging from 18 percent (in Jordan) to 105 percent (in Argentina). He also reported that 13 emerging markets had a volatility greater than 33 percent.

Over the period 1995 to 1998 (see Appendix I), unfortunately most of the companies registered a negative mean monthly return. Even the mean monthly return on the SEMDEX is almost zero (0.1) over this time period. It could be indicative of the depressed market conditions prevailing in these years. In 1995, the SEMDEX went down by 129 points, a fall of around 27 percent in the index. Even in 1996 the recovery was very sluggish, gaining only 9 points from the trough of 1995. This has been partly explained by the fact that there were an over-supply of shares during this period. It could also be due to the fact that many market participants were realising their capital gains and so the market experienced its first major correction.

## **SYSTEMATIC RISK**

The amount of risk of a share can be decomposed into two components - the unsystematic risk and the systematic risk. The sum total of the two is the total risk. The unsystematic risk represents risks that are specific to a given share and can be diversified away by holding a portfolio of assets. In an efficient market, unsystematic risk is not rewarded. Systematic risk (also called the beta value of a share) represents risks that cannot be diversified away as they are risks attached to the economy as a whole. In an efficient market, only the holding of systematic risk will be rewarded.

The beta value can range from 0 (no systematic risk, that is a risk-free asset) to 1 (same amount of systematic risk as the market portfolio) and above 1 (more systematic risk than the market portfolio). To measure systematic risk in a meaningful way, an asset-pricing model is needed. In this study, the betas of the shares are first

estimated using the Capital Asset Pricing Model (CAPM). To check the consistency of the results they are then re-estimated using the Market model.

## METHODOLOGY

The data has been obtained from the Stock Exchange of Mauritius Limited. Nine years of data for a sample of twenty-one companies had to be converted into Microfit format. The monthly return is calculated as the percentage in price adjusted for dividends, stock splits and rights issues. The author has also corrected for thin trading following the method suggested by Scholes & Williams (1977).  
ency of the results they are then re-estimated using the Market model.

In both models, the benchmark portfolio used is the monthly return on the SEMDEX. Using the CAPM, the beta values are estimated by regressing the monthly return of a share in excess of the risk free rate on the monthly return of the SEMDEX in excess of the risk free rate. The regression equation is of the following form:

$$(R_i - R_f) = \text{constant} + \beta_1 (R_m - R_f)$$

where  $R_i$  = monthly return on a share

$R_m$  = SEMDEX monthly return

$R_f$  = Weighted Treasury Bill rate

Whereas under the market model, the monthly return on a share is regressed on the monthly return of the SEMDEX and the regression equation is of the following form:

$$R_i = \text{constant} + \beta_i R_m$$

**Table 6.** Estimating Beta using the CAPM

Company	Start Month	Beta Value	t-statistic	Adj.R <sup>2</sup> (%)
AMTS	1997M1	0.54	2.01	11.72
FINC	1996M1	0.91	2.78	22.67
GBH	1996 M3	1.23	6.53	55.80
GIV	1995M6	1.47	1.88	6.60
HM	1992M1	1.23	5.50	26.78
HWF	1996 M3	0.53	2.70	15.98
IBL	1996 M3	1.38	5.94	50.97
MCB	1991 M1	0.97	11.6	58.45
MCFI	1995 M1	0.67	4.16	25.77
MDA	1995 M7	0.91	2.96	15.90
MDIT	1995 M7	0.72	3.09	17.21
MONT	1995 M7	0.68	2.05	7.23
MTMD	1995 M7	1.02	6.97	53.70
NIT	1995 M7	0.54	2.23	8.80
ROGR	1995 M1	1.17	4.68	30.81
SAVA	1995 M1	0.43	1.92	5.40
SBM	1996M8	0.52	2.66	17.87
SRES	1996 M3	0.71	3.41	24.40
UBP	1995 M1	0.68	2.39	9.07

(source: Author's computation)

From Table 6, it can be seen that most of the companies have a beta value less than one. Using the CAPM, out of nineteen companies, only six companies have a beta value greater than one. However, seventeen companies show beta values that are statistically significant either at the 1 per cent or at the 5 per cent level. The adjusted R<sup>2</sup> of these regressions range from 5 per cent to 58 per cent.

When using the market model, for most companies no major differences is found in the beta values, with the exception of HWF, IBL, SAVA, SBM and UBP. However, some improvement is noted in the statistical significance of the beta values as well as in the adjusted R<sup>2</sup> value. Nineteen companies have beta values that are signifi-

cant either at the 1 per cent level or at the 5 per cent level. In conformity with theory, in both models the constant term was statistically insignificant for all companies.

The brevity of the data series (most of the companies became listed towards the end 1995) does not allow the author to test for the stability of betas. However, this is an area for future research when longer data series become available.

**Table 7.** Estimating Beta Using the Market Model

<b>Company</b>	<b>Start Month</b>	<b>Beta Value</b>	<b>t-statistic</b>	<b>Adj. R<sup>2</sup>(%)</b>
AMTS	1995 M3	0.48	2.26	8.40
FINC	1995 M6	0.84	3.53	27.63
GBH	1993 M2	1.00	7.19	41.97
GIV	1995M6	0.85	1.87	6.50
HF	1993 M8	1.05	5.57	31.90
HM	1991 M3	1.48	5.90	29.20
HWF	1996 M3	1.05	4.70	48.92
IBL	1994 M12	2.17	3.76	26.20
MCB	1991 M1	0.98	10.36	52.83
MCFI	1995 M7	0.61	3.39	20.37
MDA	1991 M2	0.83	4.15	14.71
MDIT	1991 M2	1.02	5.73	27.73
MONT	1991 M3	0.67	3.47	10.60
MTMD	1991 M3	0.99	7.51	37.30
NIT	1993 M8	0.61	3.53	15.20
ROGR	1991 M2	1.06	7.55	37.40
SAVA	1993 M1	0.81	3.62	16.75
SBM	1995 M7	1.33	7.54	57.70
SRES	1995 M12	0.64	2.90	17.11
UBP	1991 M1	1.20	5.97	29.20

(Source: Author's computations)

The beta values obtained must however be interpreted with care as they are contingent on the asset-pricing models being well specified. Previous empirical work by Harvey (1994c), Claessens *et al.* (1995) and others on emerging markets have shown that it is unlikely that a single factor model such as the CAPM is sufficient to characterise risk in such markets. They in fact show that variance in emerging markets explains more of the variation in expected returns than covariance. In many of the emerging markets, there seems to be a clear relation between average returns and the standard deviation of returns.

Roll & Ross (1994) pointed out that if the benchmark portfolio is not efficient then there may be little or no relation between risk and expected return. If the SEMDEX is an efficient benchmark, then the risk of the individual securities can be measured by beta or by their covariance with the return on SEMDEX. In many studies this problem has been avoided by using another benchmark such as the MSCI world market portfolio. In Mauritius however, capital account restrictions were lifted only in 1995 and foreign investors were allowed to trade on the exchange only late 1994. Given that returns on the local market are not sufficiently correlated with those of other markets, particularly the industrial markets, the SEMDEX is the most appropriate benchmark.

### COMPARISON OF BETAS IN EMERGING MARKETS

**Table 8.** Betas in emerging markets

Market	Start month	Beta Value	t-statistic	Adj.R <sup>2</sup> (%)
Indonesia	1990M1	0.18	0.32	3.01
Malaysia	1985M1	0.92	3.54	29.5
Mauritius	1991M1	0.56	1.31	3.25
Nigeria	1985M1	0.23	1.03	6.09
Philippines	1985M1	0.69	2.83	10.56
Taiwan	1985M1	0.75	1.63	11.25
Thailand	1976M1	0.43	1.94	5.65
Zimbabwe	1976M1	0.27	1.15	1.02

(Source: Author's computations based on IFC's Emerging Markets Data Base)

Table 8 provides estimates of beta for some emerging markets. The monthly return for the emerging markets from the IFC's Emerging Markets Data Base, except for Mauritius. The emerging market returns were regressed on the MSCI world return,

using the market model. Only two markets show betas that are significant at the 5 per cent level and none of these markets has a beta greater than one. The low betas may be due to the fact that the MSCI world market portfolio is an industrial market portfolio and the emerging market returns are poorly correlated with this portfolio.

## **CORRELATION OF RETURNS**

In this section, the correlation of returns between the companies in the sample is investigated. The correlation coefficient is a very important statistic to shareholders in constructing a diversified portfolio of shares. The correlation coefficient can range from -1 (returns tend to move in opposite direction) to +1 (returns tend to move in the same direction). For instance, by combining shares with different correlation coefficients, the investor can tailor-make a portfolio of shares to his/her desired risk-return profile. The correlation matrix is presented below. It is found that for most of the companies their returns are positively correlated with that of other companies. Some companies (for example MCB, SBM, IBL, MTMD, and GBH) show quite strong positive correlation. Some other companies exhibit correlation close to 0.5 (see for example SRES with MCB, SRES with SBM, MCFI with SBM, UBP with MDIT, MTMD with MDA, MTMD with MOUNT, NIT with GIDC). A few companies display negative correlation of returns (Mount with UBP, SAVA with HM, Mount with FIN).

Some interesting observations in relation to the correlation of returns are found. Returns among companies in the banking sector tends to be highly correlated, returns in the sugar sector also tends to be highly correlated. The returns of the blue chip companies tend to be highly correlated.

Table 9. Estimated Correlation Matrix

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	RMCB	RMCFI	RMDIT	RMDA	RROGR	RUBP
RMCB	1.0000	.37969	.21017	.37672	.33245	.21747
RMCFI	.37969	1.0000	.076141	.17444	.19951	.15544
RMDIT	.21017	.076141	1.0000	.077119	.19553	.44217
RMDA	.37672	.17444	.077119	1.0000	.14121	-.027939
RROGR	.33245	.19951	.19553	.14121	1.0000	.12008
RUBP	.21747	.15544	.44217	-.027939	.12008	1.0000
RMONT	.26443	-.070478	.086887	.28992	.40208	-.19591
RHM	.22742	.34429	.18582	.16091	.18793	.28196
RMTMD	.59492	.36197	.21583	.46336	.57158	.27133
RHF	.092403	.10153	.28122	-.12360	.20396	.13449
RGIDC	.32129	.35463	.22582	.40333	.15703	.16974
RSAVA	.12069	.21914	.35432	.23941	.23334	.20994
RNIT	.25548	.11600	.65821	.18781	.056643	.27559
RGBH	.78297	.32316	.26137	.44682	.25339	.14035
RSRES	.48838	.21038	.064173	.32348	.15820	.14875
RAMTS	.28115	.25476	.095368	.26820	.27190	.021701
RIBL	.65138	.17362	.39692	.15450	.34932	.21792
RGCIV	.052814	.30354	.20775	.18610	-.15392	.11047
RFIN	.016826	.050629	.22829	-.027731	-.0058720	.80085
RSBM	.82876	.44643	.20589	.34424	.35452	.076615
RHWF	.17877	.060278	.50609	.20062	.27194	.27658

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ESTIMATED CORRELATION MATRIX

\*\*\*\*\*

	RMONT	RHM	RMTMD	RMF	RGIDC	SAVA
RMCB	.26443	.22742	.59492	.092403	.32129	.12069
RMCFI	-.070478	.34429	.36197	.10153	.35463	.21914
RMDIT	.086887	.18582	.21583	.28122	.22582	.35432
RMDA	.28992	.16091	.46336	-.12360	.40333	.23941
RROGR	.40208	.18793	.57158	.20396	.15703	.23334
RUBP	-.19591	.28196	.27133	.13449	.16974	.20994
RMONT	1.0000	.012564	.44482	.37854	-.013895	.22462
RHM	.012564	1.0000	.31957	.046263	.012658	-.17181
RMTMD	.44482	.31957	1.0000	.34500	.24990	.46275
RHF	.37854	.046263	.34500	1.0000	.098656	.44416
RGIDC	-.013895	.012658	.24990	.098656	1.0000	.34598
RSAVA	.22462	-.17181	.46275	.44416	.34598	1.0000
RNIT	-.065756	.14194	.044806	.081564	.41090	.30109
RGBH	.36124	.20715	.46650	.10634	.18713	.071848
RSRES	.050871	.32197	.49676	-.046871	.031559	.32065
RAMTS	.058449	.1162	-.029588	-.12580	.13523	-.12936
RIBL	.26032	.0082791	.44592	.28620	.15377	.26752
RGCIV	-.29015	.31822	-.089194	.028432	.18926	.13991
RFIN	-.41762	.086015	.12315	-.083352	.12649	.053066
RSBM	.29684	.21635	.59464	.027147	.35632	.15258
RHWF	.27399	.043728	.36296	.16901	.12716	.47983

## ESTIMATED CORRELATION MATRIX

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	RNIT	RGBH	RSRES	RAMTS	RIBL	RGCIV
RMCB	.25548	.78297	.48838	.28115	.65138	.052814
RMCFI	.11600	.32316	.21038	.25476	.17362	.30354
RMDIT	.65821	.26137	.064173	.095368	.39692	.20775
RMDA	.18781	.44682	.32348	.26820	.15450	.18610
RROGR	.056643	.25339	.15820	.27190	.34932	-.15392
RUBP	.27559	.14035	.14875	.021701	.21792	.11047
RMONT	-.065756	.36124	.050871	.058449	.26032	-.29015
RHM	.14194	.20715	.32197	.11621	.0082791	.31822
RMTMD	.044806	.46650	.49676	-.029588	.44592	-.089194
RHF	.081564	.10634	-.046871	-.12580	.28620	.028432
RGIDC	.41090	.18713	.031559	.13523	.15377	.18926
RSAVA	.30109	.071848	.32065	-.12936	.26752	.13991
RNIT	1.0000	.25044	.0033963	.30212	.25691	.20463
RGBH	.25044	1.0000	.41106	.20222	.69284	.060276
RSRES	.0033963	.41106	1.0000	-.25695	.24819	.29797
RAMTS	.30212	.20222	-.25695	1.0000	.18690	.046843
RIBL	.25691	.69284	.24819	.18690	1.0000	.0065183
RGCIV	.20463	.060276	.29797	.046843	.0065183	1.0000
RFIN	.19534	-.012939	.0035150	.0078967	.071452	.010577
RSBM	.26823	.71000	.46464	.26830	.51844	-.17250
RHWF	.44902	.27828	.029745	.023533	.29089	-.10993

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ESTIMATED CORRELATION MATRIX

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	RFIN	RSBM	RHWF
RMCB	.016826	.82876	.17877
RMCFI	.050629	.44643	.060278
RMDIT	.22829	.20589	.50609
RMDA	-.027731	.34424	.20062
RROGR	-.0058720	.35452	.27194
RUBP	.80085	.076615	.27658
RMONT	-.41762	.29684	.27399
RHM	.086015	.21635	.043728
RMTMD	.12315	.59464	.36296
RHF	-.083352	.027147	.16901
RGIDC	.12649	.35632	.12716
RSAVA	.053066	.15258	.47983
RNIT	.19534	.26823	.44902
RGBH	-.012939	.71000	.27828
RSRES	.0035150	.46464	.029745
RAMTS	.0078967	.26830	.023533
RIBL	.071452	.51844	.29089
RGCIV	.010577	-.17250	-.10993
RFIN	1.0000	-.022144	.10106
RSBM	-.022144	1.0000	.15091
RHWF	.10106	.15091	1.0000

\*\*\*\*\*

List of Abbreviations

AMTS	: Air Mauritius Limited
FINC	: Fincorp Investment
GBH	: Grand Baie Hotel
GIDC	: General Investment Development : Company
GIV	: Gamma Civic
HF	: Harel Frères
HM	: Harel Mallac
HWF	: Happy World Foods
IBL	: Ireland Blyth Limited
MCB	: Mauritius Commercial Bank Limited
MCFI	: Mauritius Chemicals Fertilizer-Industry
MDA	: Mon Désert Alma
MDIT	: Mauritius Development Investment Trust
MONT	: Mount sugar estate
MTMD	: Mont Trésor Mon Désert (sugar estate)
NIT	: National Investment Trust
ROGR	: Rogers & Co. Ltd.
SAVA	: Savannah sugar estate
SBM	: State Bank Limited
SRES	: Sun Resorts Limited
UBP	: United Basalt Products

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Year 1995 M3 to 1998 M12: Return and Standard Deviation of Return

<b>Return (%)</b>				
<b>Company</b>	<b>Max</b>	<b>Min</b>	<b>Mean</b>	<b>Std Deviation</b>
AMTS	17.9	-12.3	-1.5	6.5
FIN	14.2	-9.3	-2.3	14.4
GBH	24	-12.2	0.85	8
GCV	18.4	-50	-1.9	9.5
GIDC	32.2	-19.1	-1	11.6
HF	15.18	-11.7	-0.4	5.4
HM	19.74	-20	-0.9	7.6
IBL	85.8	-17.5	1.74	15.5
MCB	20.0	-13.0	0.96	5.2
MCFI	12.9	-17.3	-0.65	5.6
MDA	20.4	-20.1	-0.6	8.9
MONT	32.4	-18.6	-0.2	10
MTMD	10.6	-12.7	-0.5	5.7
NIT	31.7	-12.2	-0.9	6.7
RM(SEMDEX)	12.97	-10.1	0.1	4.4
ROGR	18.5	-40.9	-0.4	9.3
SAVA	20.2	-14.9	0.4	7
SBM	32.7	-18	1.9	7.4
SRES	19	-10.8	1.9	6
UBP	19.3	-41.2	-0.4	9.2

(Source: Author's computations)

## CONCLUSION

This paper has examined the sectoral evolution of market capitalisation and turnover over the period 1991 to 1999. There has been significant growth in market capitalisation and turnover in all sectors with the exception of the Transport sector. However, market liquidity in each sector remains low, with the Banking and Insurance sector showing a relatively better turnover ratio. The return characteristics of nineteen companies listed on the Port Louis Stock Exchange have also been investigated. The minimum return, the maximum return and the monthly return have been computed for each company in the sample. The mean monthly return is found to be reasonably high as well as the dispersion of the monthly return. The volatility of return, though high, is not as high as in some other emerging markets. An attempt was also made to compute beta estimates for each company in the sample. This was done using two asset pricing models, the Capital Asset Pricing Model and the Market model. Most companies show beta values that are statistically significant either at the 1 per cent level or at the 5 per cent level. The systematic risk of some emerging markets is also analysed. Bearing in mind the possible limitations of such an analysis, the results must be interpreted with care and are only indicative. Finally, in the last section of the paper, the correlation of return is investigated. Most of the companies' returns are positively correlated. Also there tends to be high positive correlation between the returns of companies operating in the same sector.

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