RETURN DISTRIBUTION CHARACTERISTICS OF LISTED PROPERTY TRUSTS AND SHARES IN MALAYSIA

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ABSTRACT

This paper analyses the return distribution characteristics of listed property trusts, property related indices and market indices in the Kuala Lumpur Stock Exchange (KLSE) over the period March 1991 to December 1999. The returns of indirect property assets were analysed to see whether they showed normal distributions. Individual listed property trusts were found to have positive skewness and excess kurtosis. The values of the skewness and kurtosis tended to reduce with increasing holding period. The property index and share market indices were found to have low values of skewness, kurtosis and Jarque-Bera statistics. This implies that the application of modern portfolio theory in investment portfolios involving property securities might be affected and adjustments to the portfolio may be needed.

Keywords: Skewness, kurtosis, Jarque-Gera statistics, normal distribution

Introduction

Modern Portfolio Theory (MPT) has increasingly been applied in the area of investment and real estate analysis. Under MPT, asset specific risk (i.e. non-systematic risk) can be reduced by efficient diversification. Efficiently diversified share portfolios will remove, non-systematic, asset specific risk thereby enabling investors to capture the return characteristics of any asset class (Markowitz, 1952; Sharpe, 1963).

Diversification is easier if returns are normally distributed. The MPT relies substantially on the assumption that the distribution of asset returns resembles the normal distribution curve that typifies random processes i.e. an independent identical distributed time series. However when the return distribution exhibits.non-normality the application of MPT may present a number of theoretical problems.

Early work by Mandlebrot (1963) suggested that the distribution of share return might have more outliers than would be expected from a normal distribution. Empiric work by Fama (1965) confirmed the non-normality of share returns.

Recent works by Myer and Webb (1993) examined the distribution characteristic (of equity real estate investment trusts (REITs), financial assets and direct real estate in the United States stock market. The study concluded that the distribution characteristics of equity REITs returns behave more like the returns on shares and closed end funds than like the returns on unsecuritised commercial real estate. The study included five individual REITs, nine real estate indices, the equity- REIT index, S & P 500 Index, eight closed-end funds and a closed-end fund index. It covered quarterly, semiannual and annual returns over the 1978 — 1990 period. The researchers found three of the five individual REITs to have non-normal distribution with significant skewness and kurtosis. The stock indices showed little

evidence of non-normality. Three of the individual closed-end funds had significant skewness and six showed significant kurtosis.

Rohit (1999) conducted a similar study for thirteen largest Australian listed property trusts (LPT), the listed property trust indices, direct property index and eight financial asset indices for the 1980 — 1998 period covering nominal and real quarterly, semiannual and annual returns. Consistent with returns of the financial assets. With increased holding period to semiannual and annual, the skewness and kurtosis were found to reduce.

Lu and Mei (1999) investigated the return distribution of property shares in emerging markets. They found that all the emerging market property returns displayed a positive skewness. Property indices had more short-term abnormal positive returns than market indices. However, six out of the nine market index returns displayed negative skewness. A majority of the property shares displayed larger kurtosis in monthly series than quarterly return series.

The average property return is generally similar to stock market returns. Property indices do not systematically outperform or underperform the market indices, but the volatility of property indices is higher than market indices.

Similar studies have also been conducted on returns of direct real estate. Notable studies include Young and Graff (1995), Graff, Harrington and Young (1997), Seiler, Webb and Myer (1999) and Brown and Matysiak (2000).

Methodology

Time series analysis and distribution analyses are two important data analysis methods to understand price behaviour. They represent two different approaches to analyzing data. In time series analysis, changes in price from day to day are examined. However, in distribution analysis, price distribution behaviour over a period of time is evaluated. Both analyses provide meaningful insights into market behaviour and can be used for investment valuation and risk management.

Distribution analysis is necessary to help in understanding how the fundamental drivers of the marketplace and the financial factors converge to reflect the characteristics of price behaviour. A return distribution defines the probabilities of returns taking on various values. A return distribution demonstrates unique characteristics which can be used in describing the returns.

The returns of an investment asset with a normal distribution can be fully described by its mean and standard deviation of the distribution. In a normal distribution, the mean, median and mode are of the same value, located at the centre of the distribution. The mean represents the value around which the distribution is centred, whereas the standard deviation measures the spread of the values about the mean. Finally, the skew reflects whether the prices distribute symmetrically around the mean or are skewed to the left or to the right of the mean.

Positive skewness indicates a distribution with an asymmetric tail extending towards more positive values. In other words, it indicates a higher than average returns i.e. the chance of getting an excess return is higher than usual. Conversely, negative skewness indicates a distribution with an asymmetric tail extending towards more negative values. A symmetrical distribution will have a skewness value of zero.

Kurtosis characterizes the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution. A strongly peaked distribution is known as leptokurtosis. In contrast, negative kurtosis i.e. platykurtosis indicates a relatively flat distribution. Kurtosis also describes the fatness of the tails of the distribution. Fat tails suggest higher

chances of prices being very high or very low. Thus, a fat-tail kurtosis captures the excess probability of abnormal returns in both directions.

A normal distribution is a bell-shaped perfectly symmetrical distribution. For a normal distribution, the skew is equal to zero with a kurtosis given by three times the variance squared.

The holding period rate of return for an investment asset is computed base on:

$$R_t = (P_t - P_{t-1})/P1 \times 100\%$$
$$\text{where } R_t = \text{ return for the period } t$$
$$P_t = \text{ Price at time period } t$$
$$P_{t-1} = \text{ Price at previous time period}$$

The rates of return for all the holding periods i.e. quarterly, semi-annual and annual returns can be calculated using the above formula.

In this case, total return was not adopted as total return series for KLSE indices are not currently available.

The Jarque-Bera GB) statistics test is carried out to test whether each of the return series is normally distributed. It can be calculated using the following formula:-

$$JB = n[S^2/6 + (K - 3)^2/24]$$
$$\text{where } n = \text{ number of observations}$$
$$S = \text{ skewness}$$
$$K = \text{ kurtois}$$

Under the null hypothesis of normality, the JB statistic has a chi-squared critical value of 5.99 at the 5% level of significance with two degrees of freedom. If the calculated JB statistic exceeds this figure, the result is that the hypothesis that the returns are normally distributed is rejected.

Data Sources

The analysis in this paper was conducted on individual Malaysian listed property trusts (i.e. Arab Malaysian First Property Trust (AMFPT), First Malaysia Property Trust (FMPT) and Amanah Hartanah PNB (AHP)) traded between December 1990 to December 1999 on the Kuala Lumpur Stock Exchange. However, the Mayban Property Trust (MPT) was not included in the study as it was listed only in 1997. The monthly closing prices of the trusts were obtained from the Investors Digest, a publication of the KLSE.

The analyses of shares were proxied by the market indices i.e. Kuala Lumpur Composite Index (KLC1), the EMAS Index, and the Second Board Index. Property related sectors were represented by the Property Index, Plantation Index and the Mining Index. All the return time series were price series and not total return series.

Table 1 shows the descriptive statistics of the various shares and indices used in the study.

Table 1: Descriptive Statistics of Listed Property Trusts, Sector Indices and
Market Indices (30 December 1999)

30 December 1999	Net value ratio	Gross capitalisation Yield (%)	Transaction PE (million)	Transaction Dividend (RM million)	Market Volume (RM billion)
Listed Property Trusts					
AMFPT	10.00	8.89	0.327	0.287	0.125
FMPT	15.38	8.72	0.106	0.065	0.068
AHP	28.75	5.22	0.762	0.809	0.115
Sector					
Property Index	(-)	1.38	329	586	29
Plantation Index	9.43	4.65	55	151	25
Mining Index	(-)	1.55	26	54	3
Market Indices					
KLCI	578.07	1.58	1.112	4,745	325
EMAS Index	(-)	1.62	2,604	8,706	505
Second Board Index	(-)	0.98	414	1,445	24

Note: (-) refers to negative PE ratio - for ordinary shares only

Source: Investors Digest (January, 2000)

The study period was from December 1990 to December 1999. The year 1991 was chosen as the starting year since it coincided with the maximum period covering all the indices and listed property trusts under study. Another reason is because the study period covers both buoyant and bear stock market conditions, hence reflecting better the distributional characteristics of the returns of the indices and securities. This careful selection of the study period avoids the results being biased towards a bull run or bear stock market condition. This study is still relevant because the stock market has recovered gradually from the Asian financial crisis in 1997-1998. Thus, any study after this period will not reflect well the volatility of returns common in the stock market.

Results

The following are the results of the analysis of the listed property trusts, shares and market indices.

Listed Property Trusts. It was found that AHP had high average return and high standard deviations, while AMFPT had lower risk and return. As the study period covered both bull and bear markets, speculative and financial factors could be expected to cause high fluctuating prices including those of listed property trusts (LPT).

Tables 2, 3 and 4 summarise the higher moments of the return distributions. The quarterly, semiannual and annual returns for the three listed property trusts indicate the presence of positive skewness and excess kurtosis. Figures 1 to 3 show the histograms of the three listed property trusts. The JB statistics are significant at the 5% level for the three LPTs.

On a quarterly, semi-annual and annual basis, AHP has the highest level of skewness. This is to be expected as it has high standard deviations resulting in higher coefficients of skewness and kurtosis. The higher standard deviations possibly reflect the high percentage of share investment by AHP in its investment portfolio. The JB statistics further confirm the non-normal distribution of AHP returns.

The other noticeable feature is that the standard deviations for the listed property trusts are high. This is expected as the return period covered both bull and bear stock market situations. The values of skewness and kurtosis tend to reduce with increasing holding period. This trend also applies to the values of the JB statistics.

Table 2: Return Distribution of Listed Property Trusts, Property Shares and Market Indices for Quarterly Periods (Mar 1991-Dec 1999)

Quarterly (Mar 1991 - Dec 1999)	Mean	Std Dev.	Skew	Kurtosis	JB Stats
Listed Property Trusts					
AMFPT	2.37	27.31	*2.83	*13.14	*202.21
FMPT	4.62	38.44	*2.98	*13.96	*233.41
AHP	13.99	96.05	*5.08	*28.1	*1101.81
Sector					
Property Index	2.75	25.44	0.55	0.90	*8.42
Plantation Index	3.77	25.49	*2.15	*8.15	*67.62
Mining Index	6.45	36.93	1.08	1.26	*11.57
Market Indices					
KLCI	3.36	21.37	0.90	1.55	*7.96
EMAS Index	3.50	22.27	0.80	1.38	*7.77
Second Board Index	6.02	28.75	0.21	0.19	*12.15

* indicates significance at 5% level for JB statistics

Table 3: Return Distribution of Listed Property Trusts, Property Shares and Market Indices for Semi-annual Periods (June 1991-Dec. 1999)

Quarterly (Mar 1991 - Dec 1999)	Mean	Std Dev.	Skew	Kurtosis	JB Stats
Listed Property Trusts					
AMFPT	4.72	37.94	1.91	*6.23	*18.79
FMPT	12.58	72.70	*3.08	*11.44	*81.97
AHP	27.06	135.76	*3.74	*14.89	*148.02
Sector					
Property Index	5.55	37.68	1.22	*3.82	4.95
Plantation Index	8.11	46.14	*3.49	*13.81	*124.23
Mining Index	12.81	61.88	*2.57	*8.65	*43.85
Market Indices					
KLCI	5.74	26.52	0.81	*2.32	2.29
EMAS Index	6.62	31.07	1.15	*3.57	4.20
Second Board Index	12.98	43.34	0.31	0.26	5.94

* indicates significance at 5% level for JB statistics

Table 4: Return Distribution of Listed Property Trusts, Property Shares and Market Indices
for Annual Periods (Dec. 1991-Dec. 1999)

Quarterly (Mar 1991 - Dec 1999)	Mean	Std Dev.	Skew	Kurtosis	JB Stats
Listed Property Trusts					
AMFPT	10.46	62.15	1.92	*4.6	*6.48
FMPT	31.85	135.20	*2.59	*7.18	*16.66
AHP	46.99	190.63	*2.88	*8.47	*23.65
Sector					
Property Index	15.26	73.69	2.07	*5.57	*8.9
Plantation Index	18.02	7.12	*2.77	*8.00	*20.86
Mining Index	37.46	133.19	*2.53	*6.98	*15.53
Market Indices					
KLCI	12.44	41.3	0.73	1.89	1.25
EMAS Index	15.26	53.63	1.42	*3.46	3.09
Second Board Index	24.90	65.32	0.75	0.94	2.43

* indicates significance at 5% o level for TB statistics

The lowest skewness and kurtosis and JB statistics are recorded by AMFPT. This is probably due to its steady stream of dividends arising from rental income from its property investment portfolio, which comprises two Class-A office buildings thus causing less speculation on this counter.

Shares. Among the property-related sectors, the Plantation and Mining sectors exhibited skewness, kurtosis and JB statistics which were significant for all the periods under study. Interestingly, for the Property Sector, the values of skewness, kurtosis and JB statistics were small. Figure 4 shows the histogram of the Property Index.
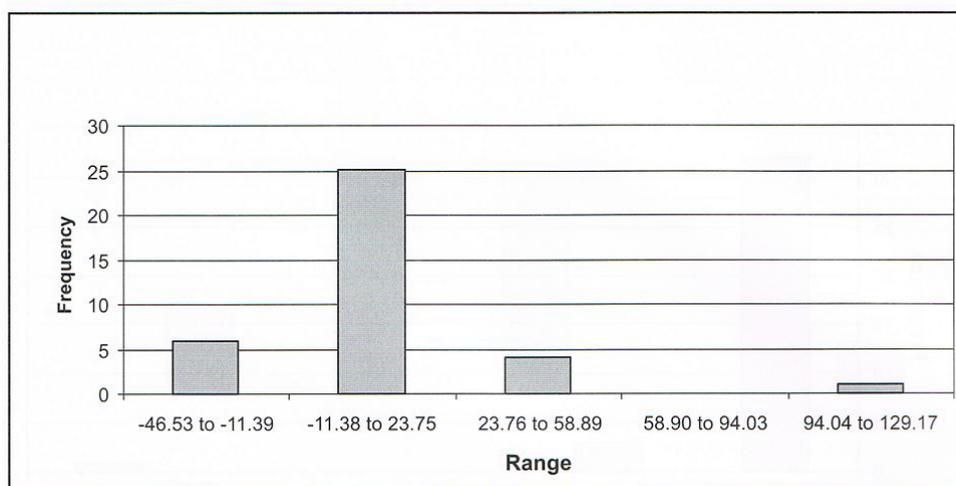

Figure 1: Histogram of Quarterly Returns of AMFPT (Mar 1991- Dec 1999)
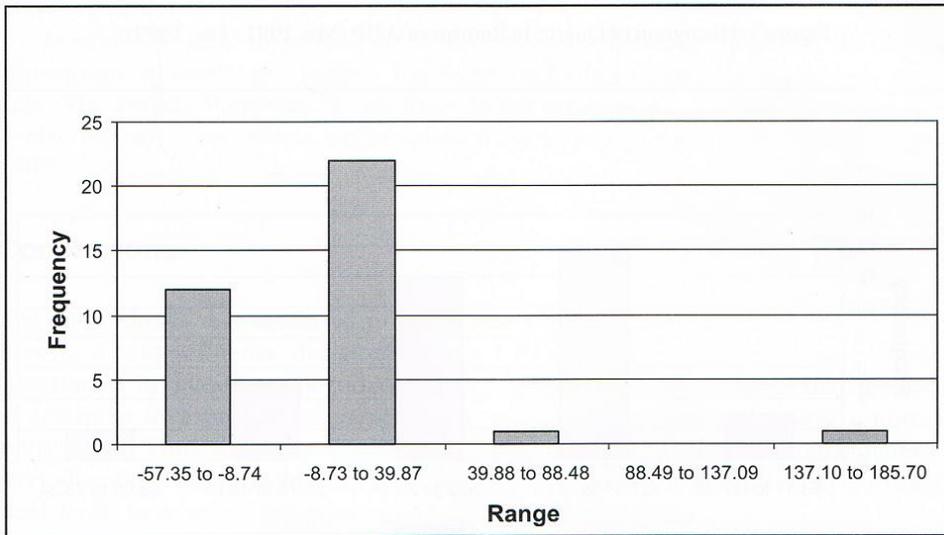
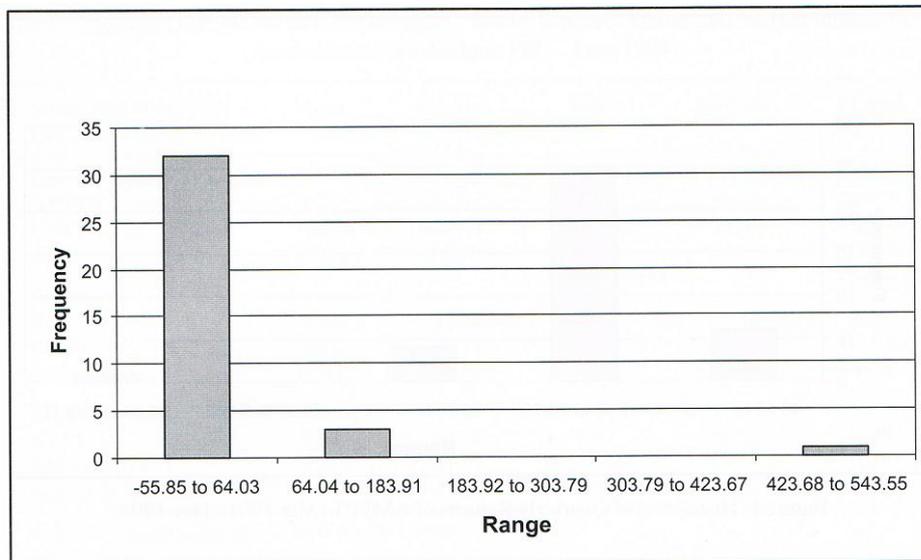Figure 2: Histogram of Quarterly Returns of FMPT (Mar 1991- Dec 1999)

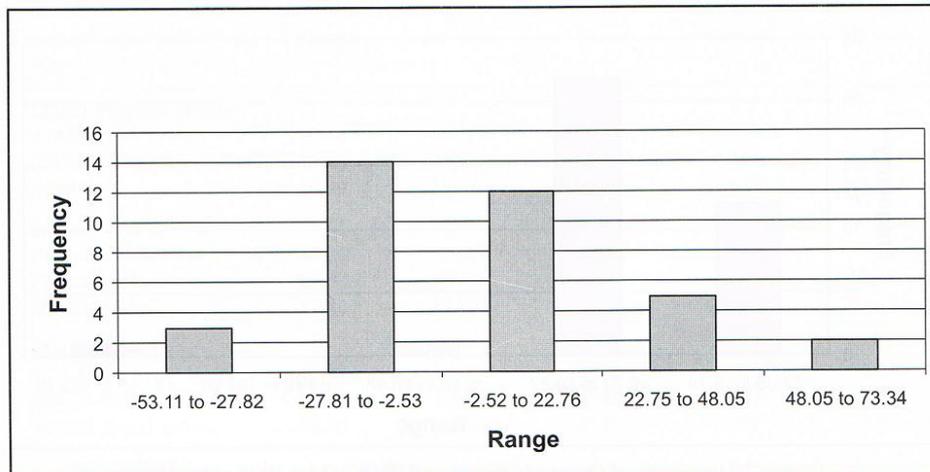Figure 3: Histogram of Quarterly Returns of AHP (Mar 1991- Dec 1999)

Figure 4: Histogram of Quarterly Returns of Property Sector index (Mar 1991- Dec 1999)

Limitations of the Study

On a quarterly basis, based on the JB statistics, the null hypothesis of the normal distribution can be accepted for the Plantation Index but not for the Property Index, Mining Index or the KLCI. With increasing holding period, the JB statistics showed that more sectors were significant. However, it is interesting to note that the KLCI was not significant for any of the three holding periods.

Market Indices. All market indices displayed a low positive skewness and low negative kurtosis. Figure 5 shows the histogram of the KLCI. The JB statistics were significant only for the quarterly period. All the measures were significantly lower for the market indices than the listed property trusts.

The reduction in skewness and kurtosis with increasing holding period could be due to the relatively small number of observations i.e. less than 30 observations. For a study period which has less than 0 observations, it is preferable to analyse further the degree of normality using histograms and probability plots.
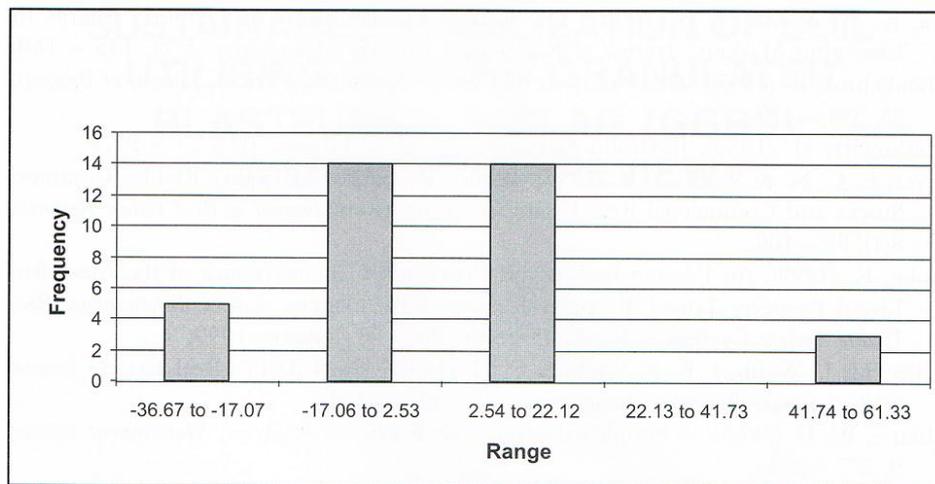

Figure 5: Histogram of Quarterly Returns of Kuala Lumpur Composite Index
(Mar 1991- Dec 1999)

It would be ideal to include direct real estate in the study; however, the lack of appropriate performance indices has hampered the opportunity to include these data. The annual Malaysian House Price Index series began in 1988 providing only twelve annual observations whilst quarterly data begins only from January - June 1997.

Conclusions

The study shows that the listed property trusts have non-normal distributions. This finding would influence decisions to use LPTs as substitutes to direct property investments in investment portfolios. Modern portfolio theory assumes that the rates of return to investments are independent, constant over time and follow a normal distribution. Thus appropriate adjustments e.g. stock selections and adjustments to asset allocation which could normalise the return distributions in investment portfolios need to be undertaken when including LPTs in the portfolios.

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