DIVERSIFICATION EFFECTS OF INDIRECT REAL ESTATE IN A MIXED ASSET PORTFOLIO: THE MALAYSIAN EXPERIENCE

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Abstract

The high percentage of world investable wealth held in property coupled with price volatility and poor returns in the equity trading market have make investors turn to property for higher return. With the introduction of Modern Portfolio Theory, portfolio investments have become the norm whereby investors seek to achieve higher portfolio returns at a given risk level or lowest risk at a given level of return.

The intent of this study is to present the benefits of including indirect real estate in a mixed asset portfolio of stocks, bonds and cash using the Malaysian data. Indirect real estate is proxed by REITs and property share.

Different return interval (monthly, quarterly, semiannually and annually) for two study period (12/1995-12/2007- whole study period; 12/1998-12/2007- post crisis period) are used to analyze the benefits of including these two indirect real estate in a portfolio. First, by applying the optimal portfolio without the indirect real estate, and then, with the inclusion of indirect real estate for both the study periods.

Low correlation between assets class is one factor which determines the attractiveness of an asset for inclusion in a mixed asset portfolio. The mean-variance criterion shall be applied in which investors are assumed to try to achieve highest return of the portfolio based on average returns and standard deviations as measure of risk. Optimal portfolio returns is computed based on equal investments of asset class and highest Sharpe ratio.

Although earlier international and local studies suggested that REITs provide a good diversification benefits in a portfolio, the findings showed that Malaysian REITs is less appealing compared to stocks, bonds and cash. Property share as expected have very high correlation and underperformed stock and are more volatile making it a less attractive investment option.

The conclusion drawn is that indirect real estate in Malaysia does not provide diversification benefits. REITs may be considered for inclusion during good economic period, but not otherwise. Historical data computed for analysis should not be in the longer period as it erodes the effectiveness of the computation. A shorter period of analysis allows changing investment environment to be taken into consideration.

Keywords: indirect real estates, mixed asset portfolio, REITs, property share, Malaysia

1.0 INTRODUCTION

The main asset classes of investments are stocks, bonds and fixed income investments while real estate is grouped under alternative investments. However investments in real estate have begun to gain popularity and real estate is becoming a main asset class of investments. There are various contributing reasons such as real estate is one of the highest percentage world investable wealth, availability and easy access to investing in securitized property, the dismal performance of stocks and bonds and the introduction of modern portfolio theory and portfolio investments.

According to Goetzmann and Ibbotson (2006), at the end of 1984, real estate comprised of 35.6% of the total investable wealth, followed by equities and bonds at 23% and 19.2%. Thus, investing in property should commensurate with the percentage of total investable wealth which it represents.

The increasing number of securitised property which is more liquid and readily accessible in the market such as REITs and listed property trusts has increased interest in real estate investments. Ciochetti, Craft and Shilling (2002) found that institutional investors have a preference for liquid investments like REITs and a declining preference for illiquid assets like direct real estate. This is possibly due to its liquidity characteristics.

The dismal performance of stock and bonds investment especially during the 1960s and 1970s as evidenced by the US markets has make investors turn to other alternative investments which provides higher returns on investments. Property, having inflation hedging characteristics provides investors a form of security against escalating inflation rate and provides higher return on investments.

The introduction of modern portfolio theory by Harry Markowitz in 1952 has also contributed to the increasing popularity of real estate as an asset class in which real estate increases portfolio returns especially its low correlation with other asset class has make it a good diversifier in a mixed asset portfolio.

The purpose of this paper is to examine the effect of including indirect real estate investment in a mixed-asset portfolio using Malaysian data. Focusing on the main issues mentioned earlier, the objectives are:

(1) To investigate the risk and return characteristics of REITs and Property Share under different study period and different return interval; and

(2) To examine the effect of including indirect real estate investment in a mixed-asset portfolio in a whole period and one sub period

It is hoped that findings from this paper will enable investors and researchers to properly assess indirect real estate performance in a mixed-asset portfolio. The findings also should enrich the empirical literature on the benefits of diversification of indirect real estate in the Malaysian context of investments. For institutional investors, the risk and return profiles of the asset class and its performance in different economic cycle would lead to policies that can reduce risk and enhance funds values, thereby maximizing shareholders wealth.

This paper is structured as follows. Section 2 reviews the literature on investments, risk and returns, correlations with other asset class and benefits of indirect real estate in a mixed-asset portfolio. Section 3 discussed the methodology and data. Section 4 reports the empirical and analyses the results. Section 5 concludes the paper.

2.0 LITERATURE REVIEW

Many researches have been undertaken to discuss the effect of including indirect real estate in a mixed asset portfolio using data in US, Europe, Australia as well as in Malaysia.

In Malysia, investments in indirect real estate can be in many forms particularly REITs and property shares. Investment in property trust in Malaysia was first in the form of unlisted property trust in 1989. The two property trusts were Amanah Harta Tanah PNB (AHP) and Mayban Property Trust Fund One (MPT). Later when Bank Negara Malaysia (BNM) approved the regulatory framework for listed property trusts, Arab Malaysian First Property Trust (AMFPT) became the first property trust listed on Kuala Lumpur Stock Exchange on 28 Sept. 1989. This is followed by the listing of First Malaysia Property Trust (FMPT) in November 1989, AHP in December 1990 and MPT in March 1997. Later when the new guidelines on Real Estate Investment Trust was introduced in 2005 these listed property trust are then known as REITs. Currently there are thirteen REITs listed in the stock exchange.

Property company shares are based on property shares index in the property sector of the Bursa Malaysia.

Risk and Return of Indirect Real Estate

Previous computations of returns and standard deviations are tabulated in Table 2.1 below. For comparisons, the monthly and quarterly risk and return in column A and B are annualized in column C. The performance of real estate securities varies quite substantially from one country to another; from one period to another; and from one asset class to another.

Generally, US, UK, France and Australia being a matured market, record steady returns and less variability of returns. On the other hand, established markets in Asian countries such as Hong Kong, Japan and Singapore generally recorded large variability.

In presenting the returns and variability of returns of a matured, established and emerging market, the returns and variance of Australia, Japan and Malaysia are discussed below.

Australia recorded annual average returns between 7.31% - 22.15% and variability of returns between 10.20% - 27.68% for various period of study between 1986 and 2004, and for different types of securitized real estate. Japan recorded annual average returns between – 2.37% to 5.59% and variability of returns between 29.20 to 32.22% for various periods between 1976 and 2004. Malaysia recorded annual average returns of between 3.66% - 23.61% and variability of returns between 22.17% to 114.67% for various periods between 1991 and 2006.

The long study period from 1976 to 2006 covers several economic situation which one way or another affects the world financial market. The 1987 market crash was a global phenomenon which affects the whole world, while the Asian Financial Crisis in 1997 affects most of the emerging markets in Asia. There are however some events peculiar to individual countries such as the real estate bubble in Japan in 1989 which causes a price decline of about 70% in the country (Kishore, 2007). Such economic happening affects countries in the world and these differentiate the returns and variability of returns of the securitized real estate.

There are few possible reasons for the difference in the risk and returns characteristics between the matured market and the new established market. In a matured market, investors perceived

Table 2.1: Risk and Return of Securitised Real Eatate

Country	Period	Asset Class	Monthly		Quarterly		Annual		Reference
			Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	
Australia	1990-2004	Securitised Real Estate	0.59%	2.96%	5.13%	13.84%	7.31%	10.25%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate					22.15%	27.68%	Stevenson (2001)
	1986-2001	Domestic R. Estate Stocks					16.00%	10.20%	Hoesli, Lekander and Witkiewicz (2004)
France	1990-2004	Securitised Real Estate	0.40%	3.69%	2.34%	16.18%	4.91%	12.78%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate					9.69%	32.36%	Stevenson (2001)
	1986-2001	Domestic R. Estate Stocks					5.20%	17.00%	Hoesli, Lekander and Witkiewicz (2004)
Hong Kong	1990-2004	Securitised Real Estate	1.19%	11.44%	5.19%	22.78%	15.25%	39.63%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate					22.43%	45.56%	Stevenson (2001)
Japan	1990-2004	Securitised Real Estate	-0.20%	8.43%	1.37%	16.11%	-2.37%	29.20%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate					5.59%	32.22%	Stevenson (2001)
UK	1990-2004	Securitised Real Estate	0.29%	5.25%	3.58%	10.84%	3.54%	18.19%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate					15.11%	21.68%	Stevenson (2001)
	1986-2001	Domestic R. Estate Stocks					11.70%	28.70%	Hoesli, Lekander and Witkiewicz (2004)
US	1990-2004	Securitised Real Estate	0.66%	4%			8.21%	13.86%	Hoesli and Moreno (2007)
	1976-1998	EREITs			3.94%	6.62%	16.72%	13.24%	Stevenson (2001)
	1/1976 - 6/1993	NAREIT Equity	1.46%	3.85%			19.00%	13.34%	Mueller, Pauley and Morrill (1994)
	1972-2002	EREITs					12.40%	18.00%	Waggle & Moon (2006)
	1980-2002	REITs	0.9875%	3.5737%			12.52%	12.38%	Lee & Stevenson (2005)
	1986-2001	Domestic R. Estate Stocks					10.60%	20.00%	Hoesli, Lekander and Witkiewicz (2004)
Singapore	1990-2004	Securitised Real Estate	0.81%	12%			10.16%	39.94%	Hoesli and Moreno (2007)
	1976-1998	Indirect Real Estate			3.51%	19.83%	14.80%	39.66%	Stevenson (2001)
Malaysia	1992-2002	LPT					23.61%	114.67%	Hishamuddin et al (2003)
	1/91-12/06	Property Share	0.003	0.107			3.66%	37.07%	Lee & Ting (2008)
		REITs equal weighted	0.013	0.218			16.77%	75.52%	
		REITs value weighted	0.004	0.064			4.91%	22.17%	

REITs more like a typical equity play, a growth play and not an income play or a longer term hedge against the markets. Thus, established REITs markets are anti-cyclical and offered long term yield and not subjected to cyclical ups and downs of the market, which is reflected in its less volatile risk.

Another possible reason for the volatility is the relative size. The money movements in matured market which are relatively bigger compared to new established market would have cause minimal change and volatility, but would cause substantial change and volatility in the new emerging markets due to the smaller market capitalization of the stock markets. In 2008, the market capitalization of Malaysian REITs stands at USD1.5 billion, in contrast with Singapore of USD19.5 billion and US of USD294.6 billion (Ernst & Young, 2008).

The infrastructure for securitized markets is still not well in place in emerging markets. Coupled with local factors such as transparency lacking in valuation process, few and far between property for investments due to landownership restrictions, lack of tax incentives, prime real estate in big cities largely owned by developers or corporate conglomerates and scarce sales transactions are some of the factors which causes the market to be more volatile.

Risk and Return of Other Asset Class

Idzorek, Barad & Meier (2007) documented the risk and return characteristics of different asset class of investments in US for the period from 1990 to 2005. Table 2.2 below records the returns and standard deviations of Global Real Estate which is represented by FTSE EPRA/NAREIT Global Real Estate Index (representing eligible real estate stocks worldwide) and its three regional sub indices along with other traditional asset class.

Global Real Estate stocks returns are slightly lower than large and small cap stocks returns, but performed better than bonds and cash.

Table 2.2: Historical Returns and Standard Deviations, 1990-2005

Asset Class	Returns	Standard Deviations
Cash	4.23%	1.88%
U.S. Bonds	7.50%	5.61%
Non U.S. Bonds	8.13%	10.62%
U.S. Large Cap Stocks	11.95%	17.89%
U.S Small Cap Stocks	12.32%	19.72%
Non U.S. Stocks	6.82%	19.37%
Global Real Estate	**11.36%**	**24.77%**
North American Real Estate	16.97%	20.44%
European Real Estate	9.53%	23.81%
Asian Real Estate	11.58%	32.56%

Source: Idzorek, Barad & Meier (2007)

In Australia, Newell & Wen (2007) tabulated the risk and return of LPTs between Q3:1995-Q4:2005 which was calculated based on quarterly returns, as in table 2.3:

The LPTs returns are higher than the stock shares and bonds return. It also registered less variability at 8.09% compared to stocks of 10.91%. Bonds returns as expected registered slight variability at 1.32%.

Risk and Returns of Malaysian LPTs

Table 2.4 tabulates the risk and returns of Malaysian LPTs.

Kok & Khoo (1995) analysis is for the period of 1/1991 – 3/1993 and 1/1991 - 3/1994. They found that generally Listed Property Trust, LPTs underperformed the market portfolio which is proxied by Kuala Lumpur

Table 2.3: Historical Returns and Standard Deviations, Q3:1995- Q4: 2005

Asset Class	Returns	Standard Deviation
LPTs	13.65%	8.09%
Shares	12.58%	10.91%
Bonds	7.51%	1.32%

Source: Newell and Wen (2007)

Table 2.4: Malaysia's LPTs Performance

Data Interval	Period	Measures	Property Trust				KLCI	MHPI	Reference
			AHP	AMFPT	FMPT	Average			
Weekly	1/1991-11/1993	Sharpe Index	0.025	0.046	0.127	0.066	0.282	-	Kok & Khoo (1995)
	1/1991-3/1994	Sharpe Index	0.141	0.118	0.147	0.135	0.176	-	
Annual	1991-1998	Sharpe Index	0.225	0.030	0.201	-	0.044	0.187	Ting (1999)
		Annual Return	52.870	9.270	36.130	-	9.17	9.27	
		Annual Risk	218.88	70.46	155.13	-	43.36	10.63	
	3/1991-3/2000	Annual Return	24.68	5.38	7.40	-	15.03	-	Newell, Ting & Acheampong (2002)
		Annual Risk	85.80	36.60	41.52	-	39.12		
			•	LPT	FD	TB	KLCI	MGS	
Annual	1992-2002	Annual Return		23.61	5.73	4.75	7.36	5.24	Hishamuddin et al (2003)
		Annual Risk		114.67	2.24	1.62	36.87	0.02	
Monthly	1/91 – 12/06			Value Weighted	Equal Weighted				Lee & Ting (2008)
		Means Std Deviation		REITs	REits	Prop. Share	Stocks	Bonds	
				0.004	0.013	0.003	0.007	0.004	
				0.064	0.218	0.107	.080	0.002	

- LPT- Listed Property Trust
- FD – Fixed Deposit
- TB – Treasury Bill
- KLCI – Kuala Lumpur Composite Index
- MGS – Malaysian Government Securities

Composite Index (KLCI) in both periods. The average Adjusted Sharpe Index for period 1/1991-11/1993 is 0.066 compared to the market portfolio of 0.282. Similarly, the average Adjusted Sharpe Index for period 1/1991 -3/1994 is 0.135 compared to the market portfolio of 0.176.

Ting (1999) compares the three LPTs with KLCI (representing shares) and Malaysian House Price Index, MHPI (representing direct properties - residential properties). Overall, LPTs performed better than shares but they are very volatile with standard deviation recorded between 70.46 – 218.88 for the period 1991-1998. It should be noted here that the KLCI was subject to over speculation period during Dec 1993 – Feb 1994, which distorts the risk and return profile of LPTs.

Hishamuddin et al (2003) analysed LPTs data from 1992-2002 on an annually basis comparing it with other asset class. Their findings showed that LPTs has the highest return and risk compared to other asset class.

Lee & Ting (2008) analysed stocks, bonds, property share and REITs performance from 1/1991 – 12/2006 based on monthly basis. The equally-weighted REITs index provides the highest returns of 15.6% but the value-weighted REITs index provides only 4.8% returns. The variability of returns for the equally-weighted REITs index appears to be the largest at 0.218 compared to stocks standard deviation of 0.080 and bonds of 0.107.

These mixed results show that under different study period, indirect real estate register different return and risk profile.

Correlations

Table 2.5 below show the correlation between indirect real estate with stocks, bonds and other asset class based on findings from previous studies.

Generally, indirect real estate are highly correlated with stocks but lowly correlated with bonds and treasury bills.

The correlation coefficient between securitized real estate and stocks in US and Australia is less compared to Hong Kong, Japan and even in Singapore and UK (UK REITs was launched in January 2007).

As for Malaysian indirect real estate, Ting (1999) study of Malaysian LPTs for the period 1991-1998 showed that the correlation coefficient between the three LPTs with stocks is between 0.88-0.91, and with direct property between -0.2 to -0.26, indicating that LPTs is not a good diversifier with stocks.

Newell, Ting & Acheampong (2002) also found that the correlation coefficient of LPTs with stocks for the period 3/1991 – 3/2000 is between 0.56 – 0.77. The lower correlation coefficient with stocks in this period compared to the findings for 1991-1998 period indicates that LPTs will benefit mixed asset portfolio with stocks during poor economic situation (Asian Financial Crisis hit the region between 9/97 – 6/98). The correlation coefficient of LPTs with stock for 1992-2002 period is 0.8433, while with cash -0.1372, with treasury bill -0.0604 and with Malaysian government securities -0.0273. This indicates that LPTs is a good diversifier for all other asset class except stock.

A study by Lee & Ting (2008) for period between 1/1991 - 12/2006 found that the correlation coefficient between equal weighted REITs with stocks and bonds are moderately strong (around 0.500) and having low negative correlation with property share and bonds.

Table 2.5: Correlations Between Asset Classes

Country	Period	Assets correlated	Correlation Coefficient	Reference
US and world	1990-2005	Global real estate and Cash Global real estate and US Bonds Global real estate and US Large Cap Stocks Global real estate and US Small Cap Stocks	-0.48 0.04 0.22 0.48	Idzorek, Barad & Meier (2007)
Australia	Q3:1995 -Q4:2005	LPTs and Shares LPTs and Bonds Bonds and Shares	0.22 0.5 -0.22	Newell and Wen (2007)
Australia	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.56 0.47	Hoesli and Moreno (2007)
Hong Kong	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.95 0.87	"
Japan	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.87 0.47	"
Singapore	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.83 0.86	"
UK	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.77 0.47	"
US	1/1990 - 6/1997 7/1997 - 12/2004	Securitised real estate and stocks Securitised real estate and stocks	0.51 0.27	"
US	1980-2002	REITs and Treasury Bill REITs and S&P500 REITs and US Government Bonds 5-7 years	-0.0304 0.4524 0.16972	Lee & Stevenson (2005)

Indirect Real Estate Performance in a Mixed-Asset Portfolio

If REIT performance is different from other financial investments performance, then adding REITs to a mixed-asset portfolio should have an impact on portfolio performance.

Mueller et al (1994), study the effect of REITs in a mixed asset portfolio of stocks, bonds and small cap, for data between January 1976 to June 1993. They found that REITs play a dominant role in increasing the risk-adjusted returns of a mixed asset portfolio at all risk levels. Adding REITs will yield additional historical returns of between 1 and 14 basis points per month or an annual increase in returns of between 12 and 168 basis points (without compounding) for the same level of risk.

Mueller & Mueller (2003) study the effect of inclusion of both public and private real estate in a mixed-asset portfolio of stocks and bonds for a five time periods, 5-, 10-, 15-, 10- and 25-year annual returns. It was found that both inclusion of public and private real estate in a mixed-asset portfolio simultaneously enhances efficiency gains over the entire risk return frontier.

Weight of REITs in optimal portfolios is large where in some cases it is up to 80% in some portfolios. Liang et al (1996) who study a period from first quarter of 1982 to the fourth quarter of 1993 however showed that the weights is in the range of 15%-20% for equity and apartment REITs.

Georgiev et al (2003) found that REITs are not suitable diversifiers for stock and bond portfolios as their returns seems to

incorporate a significant equity market component.

As Seiler, Webb & Myer (1999) pointed out after reviewing extant literatures on real estate diversification, they noted that REITs warrant inclusion in an optimal mixed-asset portfolio as it behaves more like small cap, as such having unpredictable returns and have high correlations with other asset classes, and REITs returns is significant in predicting unsecuritised return.

In the Malaysian context, using data from 1992 to 2002, Hishamuddin et al (2003) found that by including Listed Property Trust in a mixed asset portfolio has a positive effect on the efficient frontier. It provides higher return at the same level compared to a portfolio without LPTs. In other words, by including listed REIT in the investment portfolio would offer better performance.

Lee & Ting (2008) however finds that equal weighted REITs could offer some diversification benefits and return improvements for a mixed asset portfolio but not the value weighted REITs.

However, as Waggle & Moon (2006) found out, using different time interval return (monthly, quarterly, semiannually and annually) and estimation period have severe impact on optimal portfolio recommendations using the mean-variance analysis.

3.0 METHODOLOGY AND DATA

The mixed asset portfolio shall consist of stocks, bonds, fixed deposit and indirect real estate. Data will be collected for the period from 12/1995 to 12/2007. 1995 is taken as the start date to accommodate bond index which is available from 1/1994. As the country was affected by the Asian Financial Crisis, a sub period from 12/1998 to 12/2007 will be looked into. The results would provide a better picture of the effects of including indirect property during different economic scenarios i.e. during and after the Asian Financial Crisis.

- Stocks data is represented by the Kuala Lumpur Composite Index (KLCI) available from Bursa Malaysia. The data is also downloadable from Datastream. Available from 1980 onwards, it consists of daily index which records the last transaction price for the trading day.

- Bond data is sourced from MGS RAM-Quantshop Index Database available from the website http://www.quantshop.com/malaysian%20bond%20v1.htm.. There are various bond indices available from 12/2003 except the RAM Quantshop MGS index which is available from 1/1994 onwards. For this study, the RAM Quantshop MGS All Index shall represent the bond index.
- Fixed deposit data are extracted from Bank Negara Malaysia Reports. There are various term of fixed deposit rates available such as 1 month, 3 month, 6 month, 9 month, 12 month and 15 month duration, available daily from 7/1982. The rate for 6 months is adopted as it is the middle of the other durations and therefore would be representative.

- For indirect real estate, a simple price index for REITs will be constructed based on all thirteen available REITs, and for property share, data for property sector index in Bursa Malaysia is used.

- Risk free rate is represented by the Treasury bill discount rate for 3 months. The monthly data which is available from January 1986 was downloaded from Datastream. The risk free rate is applied to compute the optimal portfolio based on highest Sharpe ratio.

Returns and Standard Deviations

Total returns will be used in the computation, i.e. capital returns plus any dividend payout. According to Estrada (2005), monthly return intervals are most widely accepted in computing return intervals. However, Waggle & Moon (2006) study has shown that different return intervals yield different results and eventually different mixed asset portfolio composition.

For this study, the mean returns will be computed based on monthly, quarterly, semi-annually and annual returns. The monthly, quarterly and semi annual returns will be annualized using the following formula:

$r_A=(1+r_n)n - 1$

where rA is the annualized return

r_n is mean return for the return interval

^{n} is the number of periods there are per year

The standard deviations will be computed based on each of the four intervals and annualized using the following formula:

$\sigma_A = \sqrt{n}\,\sigma_n$

where σ_A is the standard deviation of the return interval

σ_n is the standard deviation for the subject return interval

n is the number of periods there are per year

Optimal Portfolio

In a mixed asset portfolio, the portfolio returns is a weighted average of the expected returns of individual securities or asset class comprised in a portfolio. However, the portfolio risk is not straight forward. There is a need to consider the relationship between the assets in the portfolio, i.e. the covariance of returns, which is used to calculate the portfolio variance. The standard deviation of a portfolio (SDp) is a square root of variance given by (in terms of two asset class) as follows:

$$SD_p = \{X2_1\ Var(R_1) + X^2\ 2\ Var(R_2) + 2X_1\ X2Cov\ (R_1\ R_2)\}^{1/2}$$

To build an efficient set of portfolio based on Markowitz model requires three important parameters. These are expected returns, risk and correlation coefficient.

Correlation coefficient measures the strength of the (linear) relationship between two variables (Barua, Raghunathan & Varma, 1991) or series of numbers representing data of any kind. In terms of risk reduction, the correlation determines the extent to which risk can be reduced by combining stocks or different asset class in a portfolio. Therefore, even if one asset class is volatile, but if its correlation coefficient is low, it may lower substantially the volatility of a portfolio of investments which it is included in.

The correlation coefficient is computed as follows:

$$Corr_{xy} = \frac{Cov_{xy}}{SD_x\ SD_y}$$

Where;

$Corr_{xy}$ = correlation coefficient between x and y

Cov_{xy} = $E\{[x - E(x)][y - E(y)]\}$ = (covariance between x and y)

$SD_x\ SD_y$ = standard deviation of $_x$ multiply by standard deviation of $_y$

Diversification benefits shall be determined by analyzing the expected portfolio returns before and after inclusion of indirect real estate. A higher expected portfolio return or lower portfolio risk level after inclusion of indirect real estate in a mixed asset portfolio is considered as yielding benefits to the portfolio investment.

For this paper, optimal portfolio is those which provide the highest risk-adjusted returns based on Sharpe ratio and those which increase portfolio returns based on equal investments of assets.

The computation for Sharpe measure is as follows:

Sharpe measure = (Portfolio Return – Risk-Free Rate) / Std Deviation

4.0 FINDINGS AND DISCUSSIONS

Normality Test

Returns distribution of asset classes were tested for normality using Kolmogorov-Smirnov test in SPSS. The result is as in Table 4.1 below showed that fixed deposit and reits returns are not normally distributed.

Returns

The annualized returns as well as the semiannual, quarterly and monthly returns are tabulated in table 4.2 below. Generally, stocks and property share have similar returns trend in which the quarterly return intervals recorded higher average compared to the other returns intervals period. Bonds and cash returns did not differ much between the four return intervals for both study periods. REITs returns trends however differ between the two study periods. The returns did not differ much between the different interval returns during the whole study period behaving more like bonds and cash, but during the recent period, it behave more like stocks and property shares in which the quarterly returns interval is higher.

Returns for Whole Study Period (12/1995-12/2007)

The whole study period from 12/1995 – 12/2007 includes the Asian Financial Crisis of 1997/1998. The low returns especially the negative returns of REITs investment reflect the bad economic situation. REITs return was negative (-1.37 based on annual return interval). Bonds was the most attractive investment class providing highest return (6.51% based on annual return interval) followed by stocks at 6.23%, and cash at 4.51%. Property share too yield low returns at 0.19% throughout the whole study period. Figure 4.1 display the annualized returns based on semi, quarterly and monthly return intervals.

Table 4.1: Return Distributions of Asset Class

		Property Share	KLCI	Bonds	FD	REITs
N	Mean	167	167	167	167	167
Normal Parameters(a,b)		-.0005	.00471	.00489	4.61	-.0023
	Std. Deviation	.1056	.0797	.0102	1.930	.1001
Most Extreme Differences	Absolute	.086	.094	.112	.310	.175
	Positive	.086	.094	.112	.310	.175
	Negative	-.067	-.083	-.097	-.202	-.114
Kolmogorov-Smirnov Z		1.111	1.209	1.453	4.004	2.257
Asymp. Sig. (2-tailed)		.170*	.108*	.029*	.000	.000

* normal distribution (p-value of greater than 0.025)

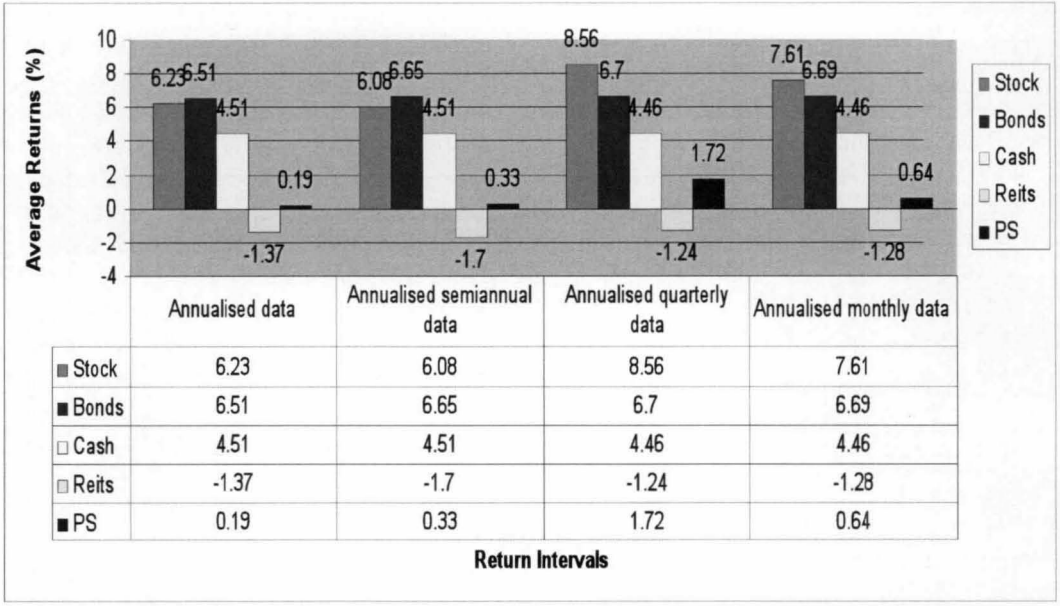

Figure 4.1: Annual Returns for Various Asset Classes Based on Different Return Intervals for Period 12/1995-12/2007

Returns for Post Crisis Period (12/1998 – 12/2007)

The recent period from 12/98 to 12/2007 reflects the improving economic situation. Stock recorded highest return among the four asset class (10.61% based on annual return interval and 20.58% based on quarterly return interval). Property share which are also stocks recorded high returns (6.97% based on annual return interval and 13.53% based on quarterly return interval). REIT too improved its performance for this post crisis period by providing 8.83% return based on annual return interval and 12.93% based on quarterly return interval. Bonds recorded slightly higher returns in the recent period (7.15% based on annual return interval). Cash is less attractive investments during strong economic period recording lower returns of 3.58% based on annual return interval.

Risk

The standard deviations for all four asset class are as in figure 4.3 and 4.4 below. Stocks, REITs and property shares are risky investments. In both periods, these three asset classes showed higher standard deviations of returns compared to bonds and cash. The standard deviation measured based on quarterly intervals for these three groups of `stocks' were higher among the four intervals. Bonds and cash are less risky. The low standard deviation in both periods showed that both bonds and cash are a better investment options for investments especially during bad economic situation.

Standard Deviation for Whole Study Period (12/1995-12/2007)

Based on quarterly interval for the whole study period, property shares are the most volatile investment, recording as high as 0.4064 standard deviations. Next is REITs which registered as high as 0.3598

Table 4.2: Means and Standard Deviation of Asset Class at Different Period Interval

	Stocks	Bonds	Cash	REITs	Prop Share	Stocks	Bonds	Cash	REITs	Prop Share
	12/1995 – 12/2007 (Whole Study Period)					12/1998 - 12/2007 (Post Crisis Period)				
1 Annual Returns										
Mean	6.23%	6.51%	4.51%	-1.37%	0.19%	10.61%	7.15%	3.58%	8.83%	6.97%
Std Dev.	0.2386	0.044	0.0196	0.3389	0.3410	0.1797	0.0473	0.7649	0.2765	0.2947
2 Annualised semi annual returns										
Mean	6.08%	6.65%	4.51%	-0.17%	0.33%	14.82%	7.46%	3.45%	11.51%	10.92%
Std Dev.	0.2487	0.047	0.0208	0.3406	0.3578	0.2017	0.0511	0.0058	0.3005	0.3226
Semi annual returns										
Mean	2.99%	3.27%	n.a.	-0.85%	0.16%	7.15%	3.66%	n.a.	5.60%	5.32%
Std Dev.	0.1759	0.0332	n.a.	0.2409	0.2530	0.1427	0.0361	n.a.	0.2125	0.2281
3 Annualised quarterly returns										
Mean	8.56%	6.70%	4.46%	-1.24%	1.72%	20.58%	6.90%	3.42%	12.93%	13.53%
Std Dev.	0.3419	0.0399	0.0196	0.3598	0.4064	0.325	0.0392	0.0051	0.3359	0.384
Quarterly returns										
Mean	2.07%	1.63%	n.a.	-0.31%	0.43%	4.79%	1.68%	n.a.	3.09%	3.22%
Std Dev.	0.1709	0.0200	n.a.	0.1799	0.2032	0.1625	0.0196	n.a.	0.168	0.192
4 Annualised monthly returns										
Mean	7.61%	6.69%	4.46%	-1.28%	0.64%	14.93%	6.54%	3.39%	8.83%	6.60%
Std Dev.	0.2825	0.0347	0.0201	0.2997	0.3581	0.2206	0.0289	0.0045	0.2587	0.2633
Monthly returns										
Mean	0.61%	0.54%	n.a.	-0.11%	0.05%	1.17%	0.53%	n.a.	0.71%	0.53%
Std Dev.	0.0815	0.01	n.a.	0.0865	0.1034	0.0637	0.0083	n.a.	0.0747	0.076

n.a.- not available

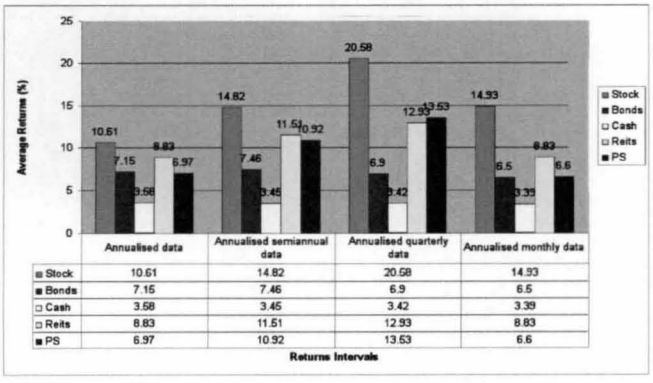

Figure 4.2: Annual Returns for Various Asset Classes Based on Different Return Intervals for Period 12/1998-12/2007

followed by stocks at 0.3419. Bonds and cash both registered 0.0399 and 0.0196 standard deviations respectively.

less volatility during good economic period after the Asian Financial Crisis. Based on quarterly interval, property share recorded

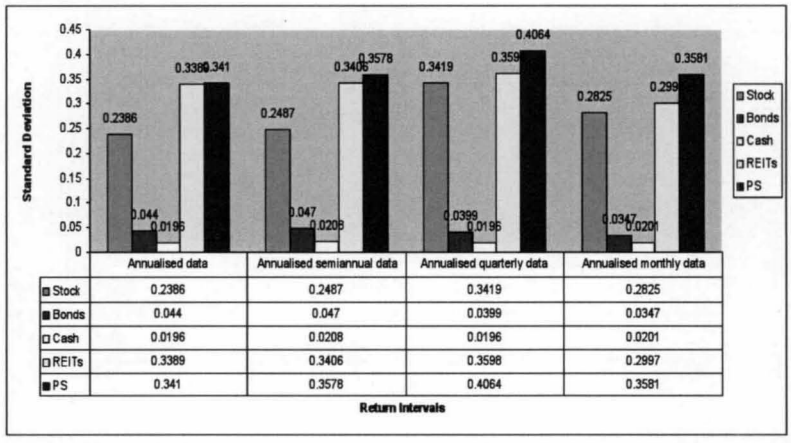

Figure 4.3: Standard Deviations of Various Asset Classes Based on Different Return Intervals for Period 12/1995-12/2007

Standard Deviation for Post Crisis Period (12/1998-12/2007)

The same trend continues in the second period for all asset class. Property share, REITs and stock registered high standard deviation between the asset class but lower than that registered for the whole study period. This indicates that there is

as high as 0.384 standard deviations followed by REITs at 0.3359 and stock at 0.325. Bonds and cash too recorded a lower standard deviations compared to the whole study period at 0.0399 and 0.0051.

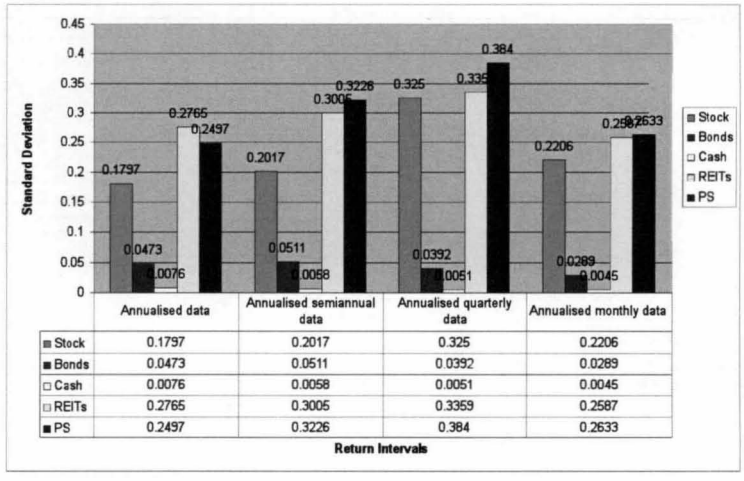

Figure 4.4: Standard Deviations of Various Asset Classes Based on Different Return Intervals for Period 12/1998 - 12/2007

REITS Correlations with Other Asset Class and Diversification Benefits

The following table shows the correlation coefficients of REITs with other asset class. However REITs correlations coefficient with cash is negative during the whole study period (between -0.234 to -0.542) and low positive (between 0.037 to 0.501) during post crisis period suggesting that REITs diversify better with cash during poor economic period.

Table 4.3: REITs Correlation Coefficients With Other Assset Classes for Both Study Period.

REITs with Stocks				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	0.482	0.61	0.645	0.492
Post Crisis period(12/98-12/07)	0.008	0.351	0.56	0.258
REITs with Bonds				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	0.09	0.306	0.267	0.1
Post Crisis period (12/98-12/07)	-0.251	0.16	0.154	0.014
REITs with Cash				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	-0.542	-0.399	-0.306	-0.234
Post Crisis period (12/98-12/07)	0.268	0.501	0.246	0.037

Generally REITs have low positive correlations with bonds, low positive and negative correlations with cash at different study period, and moderately strong correlation with stocks.

REITs have lower correlations with stocks during post crisis period as shown in table 4.3 above. The correlation coefficient is between 0.008 – 0.351 based on different return intervals at post crisis period compared to between 0.482 – 0.645 during the whole study period. This indicates that REITs diversify better with stocks during better economic period.

Correlation coefficient with bonds is also better during recent study period. Its correlation coefficient with bonds seemed low for both periods i.e. between 0.09 to 0.306 during the whole study period and between 0.014 to -0.251 during post crisis period, indicating that REITs is a good diversifier for bonds at any economic situation.

Property Share Correlations with Other Asset Class and Diversification Benefits

Table 4.4 below shows the correlation coefficients of Property Share with other asset class. Property Shares have very high positive correlation coefficients with stocks for both study periods reflecting its characteristics as share. Its correlation coefficient is between 0.803 - 0.932.

Property Share has low positive and negative correlation coefficient with bonds (between -0.011 – 0.314) for both periods indicating a good diversifier at all times. Similarly, Property Shares have negative correlation coefficient with Cash during whole study period (between -0.191 to -0.458) and mixed positive and negative correlation coefficient (between -0.005 to 0.382) during recent period, also indicating a good diversifier for cash at all times.

Table 4.4: Property Shares Correlation Coefficients With Other Asset Classes for Both Study Period

Property Shares with Stocks				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	0.932	0.895	0.891	0.86
Post Crisis period (12/98-12/07)	0.896	0.834	0.881	0.803
Property Shares with Bonds				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	-0.011	0.314	0.246	0.114
Post Crisis period (12/98-12/07)	-0.35	0.15	0.086	-0.095
Property Shares with Cash				
	Annual	Semi annual	Quarterly	Monthly
Whole period (12/95-12/07)	-0.458	-0.358	-0.245	-0.191
Post Crisis period (12/98-12/07)	-0.025	0.382	0.237	-0.005

Diversification Gains - REITs

Equal Investments - Based on equal investments, the portfolio returns have increase marginally, between 0.11% - 0.72%. The standard deviation, on the other hand, has increased between 2.1% - 3.58%. The Sharpe ratio too reduced between 0.1119 – 0.1645 points. Therefore, REITs do not provide much diversification benefit.

Highest Sharpe Ratio - There is a very little difference in terms of portfolio returns, standard deviation as well as the increase in Sharpe ratio, with the inclusion of REITs. Cash dominates the portfolio with an asset allocation of approximately 80% followed by bonds for the remainder 20%. Allocation to REITs is less than 1%.

Table 4.5 below tabulated the results of REITs in a mixed asset portfolio.

Diversification Gains - Property Share

Similar to REITs, the inclusion of property share in a mixed portfolio of stocks, bonds and cash too do not yield much diversification benefits. This is especially so since property share returns at all different returns intervals are lower than REITs and its standard deviation are higher than stock. Furthermore its, correlation with stock is also high, thus providing little diversification benefits with stock.

Equal Investments - Based on equal investments, the portfolio returns have increased marginally, i.e. less than 1%. The standard deviation, on the other hand, has increased between 3.7% - 6.08%. The Sharpe ratio too reduced between 0.1819 – 0.3066 points. Therefore, Property Share too does not provide much diversification benefit.

Highest Sharpe Ratio - There is no difference in terms of portfolio returns, standard deviation as well as the increase in Sharpe ratio, with the inclusion of Property Share. Cash dominates the portfolio with an asset allocation of approximately 80% followed by bonds for the remainder 20%. There is NO allocation for Property Share.

5.0 CONCLUSION

In this paper, using monthly, quarterly, semi annually and annual return interval of stock, bonds, cash, REITs and property

Table 4.5: Benefits of REITs in a Mixed-Asset Portfolio.

	Returns		S. Deviation		Sharpe Ratio		Difference		
	Before	After	Before	After	Before	After	Returns	Std Dev	Sharpe Ratio
1. Equal Investment									
Annual	7.11%	7.50%	0.0585	0.08	0.7136	0.575	0.39%	0.0215	-0.1386
Semiannual	8.58%	9.30%	0.0753	0.109	0.7485	0.584	0.72%	0.0337	-0.1645
Quarterly	10.30%	11.00%	0.1132	0.149	0.6499	0.538	0.70%	0.0358	-0.1119
Monthly	8.29%	8.40%	0.075	0.096	0.7125	0.571	0.11%	0.021	-0.1415
2. Highest Sharpe Ratio									
Annual	4.40%	4.80%	0.012	0.015	1.2119	1.24	0.40%	0.003	0.0281
Semiannual	4.07%	4.10%	0.0113	0.011	1.0013	1.001	0.03%	-0.0003	-0.0003
Quarterly	3.95%	3.90%	0.0086	0.009	1.1681	1.168	-0.05%	0.0004	-1E-04
Monthly	4.09%	4.10%	0.0077	0.008	1.4881	1.491	0.01%	0.0003	0.0029

Table 4.6: Benefits of Property Share in a Mixed-Asset Portfolio.

	Returns		Std. Dev.		Sharpe Ratio		Difference		
	Before	After	Before	After	Before	After	Returns	Risk	SR
1. Equal Investment									
Annual	7.11%	7.10%	0.0585	0.102	0.7136	0.407	-0.01%	0.0435	-0.3066
Semiannual	8.58%	9.20%	0.0753	0.13	0.7485	0.479	0.62%	0.0547	-0.2695
Quarterly	10.30%	11.10%	0.1132	0.174	0.6499	0.468	0.80%	0.0608	-0.1819
Monthly	8.29%	8.00%	0.075	0.112	0.7125	0.449	-0.29%	0.037	-0.2635
2. Highest Sharpe Ratio									
Annual	4.40%	4.40%	0.012	0.012	1.212	1.212	0.00%	0	0
Semiannual	4.10%	4.10%	0.011	0.011	1.001	1.001	0.00%	0	0
Quarterly	4.00%	4.00%	0.009	0.009	1.168	1.168	0.00%	0	0
Monthly	4.10%	4.10%	0.008	0.008	1.488	1.488	0.00%	0	0

share representing indirect real estate, has shown that different estimation period (12/95 – 12/2007 and 12/98 -12/2007) and different return intervals resulted in means, standard deviation and correlation coefficient of asset returns variations. These variations affect the portfolio returns, risk reduction and sharpe ratio of the portfolio.

Indirect properties returns are generally the lowest during the long study period (12/95-12/2007) which includes the Asian Financial Crisis (97/98). REITs register a negative returns in this period. Both performed better during the post crisis period beginning after the Asian Financial Crisis (12/98-12/2007), registering returns higher than bonds and cash, but lower than stock. These findings is inline with Waggle & Moon (2006) which noted that estimation period for REITs is best used based on recent period as it would be more relevant, taking into consideration changing nature of the investment environment. In this case, the changing economic environment has substantial effect on the mean-variance input.

In terms of risk, both REITs and property share are very risky asset class, with standard deviations higher than stock, which is already known for its volatility. It is however less volatile during good economic period as shown in the post crisis period.

Different study period, in this case between 12/1995 – 12/2007 and between 12/1998 – 12/2007 and different return interval i.e. annually, semiannually, quarterly and monthly, resulted in different portfolio returns and risk as the average returns,

standard deviation and correlation coefficient computed varies. During the longer period, the effect of Asian Financial Crisis has caused a negative returns in REITs while in the post crisis period, REITs over performed Bonds and Cash.

Including indirect property in a mixed asset portfolio do not gain much diversification benefits. Correlation coefficient with stock is moderately strong and correlation with bonds and cash is positive and negative low. But the lower returns compared to stock and higher standard deviations have made these asset classes less appealing. The increase in portfolio returns are minimal and in some instances, are reduced and the portfolio risk increases much higher than the increase in portfolio returns. Coupled with a reduction in the Sharpe ratio, including REITs or Property Share does not provide diversification benefits.

Summary

Both the indirect real estate did not gain much allocation in a mixed asset portfolio. The increase of both portfolio returns and Sharpe index is very much negligible and at some point, based on different return interval tested, decreases the portfolio returns and Sharpe index. Most of the allocations are dominated by bonds and cash. Referring to the annual returns computation, the allocation for an optimal portfolio based on highest Sharpe Index is 76% cash, 19% bonds and 5% stock. For other return intervals tested too showed that both cash and bonds dominated the portfolio.

The results suggest that REITs do not warrant inclusion in a mixed asset portfolio during bad economic situation but could be considered during stable economy. Bonds and cash, and to some extent, stocks are still the best option in a mixed asset portfolio in the Malaysian context.

The limitation for this study is the absence of a proper REITs index to represent the indirect property. The index created based on simple price index, are also shown to be not normally distributed.

Further studies could be extended in the future for a longer study period and availability of more REITs data and the analysis of risk profiles of investors in order to come up with a proposed asset allocation which best reflect an investor's tolerance towards risk.

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