

PORTFOLIO OPTIMISATION MODEL FOR MALAYSIAN PROPERTY MARKET

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Abstract

Purpose - This paper investigates the significance of commercial property investment in Malaysia in a mix asset portfolio from January 1998 to April 2010.

Design/methodology/approach – Data for the research was obtained from DataStream which taken from Kuala Lumpur Composite Index (KLCI), Malaysian Government Securities (bonds), Kuala Lumpur Stock Exchange Properties (properties), Malaysia Treasury Bill Discount Rate (Cash) and Kuala Lumpur Stock Exchange Plantation (plantation).

Findings – This paper provide some dependable model and technique in term of portfolio optimisation. As a result it also provides more accurate result the role of property portfolios in mixed-asset portfolios. In term of diversification benefit Malaysian property market showed some improvement in the recent years. While in asset allocation property portfolio gives property portfolios gives some significant allocation at all risk levels.

Originality/value – This paper examines the role of property investment in Malaysia in a mix asset portfolio.

Keywords Malaysia, portfolio, optimisation

Paper type Research paper

1. Introduction

Recently, global property securities are more focus on the role of Malaysian commercial property in international property portfolios. In the global context, Malaysia contributes USD22.7 billion or 1.2% of the total market capitalisation of international property securities companies and ranked at number 16 (Macquarie, 2011). And from the Asian property performance, Malaysia contributes 4.3% with 83 property companies (see Table I). Malaysia has also introduced Real Estate Investment Trusts (REITs) in August 2005. Malaysian REITs contribute 0.2% of the global REITs market and 3.8% of the Asian REITs market. Malaysia and was ranked as the 12th largest REITs market in the global market (Macquarie Securities, 2011). The increasing interest in property investment throughout the world can be seen in global commercial property transactions in 2009 worth USD 379 billion (RCA, 2010). In Asia, a total of USD 968 billion was transacted being 46% of global transactions (RCA, 2010)

In addition, Kuala Lumpur as the capital city of Malaysia has commercial property investment worth of USD 2.0 billion until 3rd quarter (RCA, 2011). Since the recovery from the Asia financial crisis in 1997/98, the government of Malaysia has implemented investment friendly policies to encourage foreign investment in the property market. These endeavours have enhanced the transparency of the real estate sector in Malaysia, which is reflected in the global real estate transparency index. Malaysia is ranked as one of the transparent markets in the world (see Table III). From the economic and key performance indicators point of view, Malaysia has shown strong growth in 2009 though hit by the global financial crisis.

Table I. Asian Listed Property Companies Composition 2010

Country	Market capitalisation	No. of companies	No. of REITs	% of global market	% of Asia market
HK	384.48	134	7	20.10	42.54
Japan	190.24	139	34	9.94	21.05
Singapore	165.6	67	23	8.66	18.32
China	101.76	80	-	5.32	11.26
Philippines	20.32	35	-	1.06	2.25
Malaysia	22.72	83	14	1.19	2.51
Thailand	14.08	51	6	0.74	1.56
Taiwan	23.2	47	8	1.21	2.4
Indonesia	12.8	42	-	0.67	1.42
South Korea	0.48	7	6	0.03	0.05

Source: Macquarie Securities (2010)

Table II: Economic and Financial Profile of Malaysia in 2009/2010

GDP (billion)	383 billion (2009)
GDP growth	5.3% (Q3 2010)
GDP- PPP (billion)	13 800
Population	27.8 million
GDP Sectors	
Agriculture	9.4%
Industry	40.9%
Services	49.7%
Labor Force (million)	11.4
Unemployment	3.2% (Q3 2010)
Household Income	
Lowest 10%	2.6%
Highest 10%	28.5%
Investment (gross fixed)	20.1% of GDP
Inflation rate	1.9% (Q3 2010)
Internet users (million)	16.9 (#51 comparison to the world)
Property Transaction Volume (Billion)	2.8
Business Competitiveness Index	#24
Corruption Perception Index	#56
World Competitiveness Index	
Economic Performance	#160
Government Efficiency	#43
Business Efficiency	#30
Infrastructure	#30
Overall	#26
Real Estate Transparency Index	#23

Source: WEF (2009, 2010), RCA (2010), Transparency International (2009), CIA (2010) and JLL (2009)

Table III. Global Real Estate Transparency Index: 2010

Highly transparent		
Australia	Canada	United Kingdom
New Zealand	Sweden	United States
Ireland	France	Netherlands
Germany	Belgium	Denmark
Transparent		
Finland	Spain	Austria
Singapore	Norway	Hong Kong
Portugal	Switzerland	Italy
Poland	South Africa	Czech Republic
Malaysia	Japan	Hungary
Israel		
Semi transparent		
Greece	Slovakia	Russia
Romania	Taiwan	Chile
Turkey	Dubai	Brazil
Thailand	Bulgaria	India
Low transparent		
Oman	Morocco	Croatia
Egypt	Saudi Arabia	Qatar
China	Lebanon	Panama
Kuwait	Uruguay	Kazakhstan
Opaque		
Syria	Sudan	Algeria

Source: JLL (2010)

Real Estate is a type of assets considered adding into a multi-asset portfolio (Hui and Yu, 2010). Furthermore property is one of the eligible asset classes for inclusion in the multi-asset portfolios of institutional investors (MacGregor and Nanthakumaran, 1992). According to Lizieri and Finlay (1995), the use of portfolio theory provides a framework for decision-making and forces investors to provide a rigorous justification of the portfolio. Numerous studies have concentrated on the risk-adjusted performance of property portfolios to the significant contribution to property growth in the country.

These include, Kuhle *et al.* (1986), Abdul-Rasheed and Tajudeen (2006), Stevenson (2001), Morrel (1991), Cheong *et al.* (2009), McGreal *et al.* (2006) and Lee (1999). While Cheong *et al.* (2009) suggested that portfolio managers may now consider to be appropriate vis-à-vis their holdings of bonds, equities and securitised property (under its different structures) in the portfolios for both their tactical and strategic asset allocations. Lee and Stevenson add (2006) any examination of real estate in the mixed-asset portfolio needs to be assessed with a more acceptable time-series of real estate returns. Hutchison and Nanthakumaran (2000) added a principal component of various techniques to analyse the worth of property investment is stock selection, which seeks to acquire mispriced assets with a view to adding value to the portfolios. Hui and Yu (2010) also added many studies conclude that the risk-adjusted returns on real estate are greater than stocks and bonds therefore real estate plays an important role in portfolio management and asset allocation since it has hedging effect on inflation and helps diversify portfolio risk. While Sivitanides (1998) and Sing and Ong (2000) found that mean variance optimisation related to downsize risk.

There are extensive studies dedicated in the Asian property markets such as Liow and Adair, 2009; Liow, 2007, 2008; Jin *et al.*, 2007; Liow and Sim, 2006; Oii *et al.*, 2006; Wilson *et al.*, 2007; Gerlact *et al.*, 2007; Addae- Dapaah and Loh, 2005; Oii and Liow, 2004; Bond *et al.*, 2003 and Mei and Hu, 2000). Some authors such as Ling and Naranjo (2002) observe on cross-country analysis on commercial real estate return. In addition, specific Asian countries were also examined in China (e.g. Newell *et al.*, 2005, 2009), Hong Kong (e.g. Chau *et al.*, 2001, 2003, Newell and Chau, 1996; Newell *et al.*, 2004,

2007; Schwann and Chau, 2003), India (e.g. Newell and Kamineni, 2007) and Singapore (e.g: Liow, 2001a, 2001b; Ong, 1994, 1995; Sing and Low, 2000). Only Ting *et al.* (2007) and Ting and Tan (2008) showed interest towards the Malaysian property market although it is only for residential property. Although Lee and Ting (2009) demonstrated the diversification benefits and return enhancement of Malaysian REITs in a mixed asset portfolio, no similar evidence was found for property companies. The results show that property shares have neither diversification potential nor return enhancement in a mixed asset portfolio in both mean variance and downside risk optimisations.

2. Portfolio Optimisation

For many the most commonly utilised risk-adjusted benchmark is the sharp ratio which provides a measure of reward per unit of risk (Higgins and Ng, 2009). However, the results usually difficult to interpret especially for average investors (Bernstein, 2004). Most prior studies of optimal real estate allocations rely on traditional mean-variance optimisation using short-term returns (MacKinnon and Al Zaman, 2009). Investors tend to choose the most profitable investment among the multi portfolios. Country also wants to know which investment needs to be strengthening in order to attract more investors. Harry Markowitz (1952) introduced portfolio-selection technique or modern portfolio theory (MPT). The mean variance analysis created by Markowitz (1952) is currently the major source for researcher in financial studies. The Markowitz Efficient Frontier is the set of all portfolios of which expected returns reach the maximum given a certain level of risk (Lee *et. al*, 2010). Merton (1972) stressed that the set of optimal portfolios is lying in the mean-variance space which called efficient-frontier. According to Bodnar and Schmid (2009), the parameters of the efficient frontier are unknown and have to be

estimated which is called as the sample efficient frontier. From the results, the investors or any stakeholders may choose the best investment which low risk and high return. Portfolio optimisation analysis generally based on return, risk and variance of portfolios. Markowitz was the first to clearly and rigorously shows how the variance of portfolio can be reduced through the impact of diversification (Lee *et. al*, 2010). And Feldman (2003) mentioned his research that optimal allocation to commercial real estate ranging from 0% to 42% depending on the index and target return. According to Lee and Stevenson (2003), the modern portfolio theory (MPT) portfolio optimisation is an ex ante model of portfolio analysis; so the more accurate the forecasts of the portfolio inputs, the better a fund manager's ability to take advantage of the future return and covariance structure, the greater his/her ability to exploit the risk/return trade off. They added, the best performance in an ex ante context the mean-variance model requires accurate forecasts of the future return and covariance structure. In addition, with financial crisis and its contagion effects across almost all asset markets as well as national financial markets illustrate that returns are not normally distributed and correlation are time-varying and increase strongly during downward moving market phases when diversification is most needed by investors (Kroencke and Schindler, 2010). And Gilberto (1992) also suggested real estate' role in an institutional portfolio by using the mean-variance framework. Hui and Yui (2010) in their paper also discussed in detail on appropriate percentage allocated to real estate for a well-diversified multi-asset portfolio.

3. Methodology and Data

The Markowitz efficient frontier is the set of all portfolios of which expected returns reach the maximum given a certain level of risk (Lee *et. al*, 2010). Establishing an appropriate investment strategy involves defining a clear investment goal and objective, and the acquisition of different classes of assets (Hui and Yu, 2010). This research measured the level of return by analyse the expected value of the each portfolios investment in Malaysia including indirect property, shares, bonds, finance, plantation, and industrial. Moreover, risk assumed by expected value of the asset allocation of returns. As a result, variance and standard deviation derived from this calculation. To assess the portfolio optimisation, efficient frontier portfolio was used which minimise the risk for a required expected return and maximise the expected return for a given level of risk. There are several options to analyse portfolio optimisation such as Excel solvers or optimisation tools such as MATLAB. This study used Excel solver to obtain optimal value. Similar to research done by Hui and Yu (2010), the proportion of assets in a portfolio depends not only on their means and variances, but also on the interrelationships so called covariance. They added, covariance between assets as well as returns and variances are calculated as an input in portfolio optimisation. Several asset classes were assessed such as shares, property, bonds, plantation, financial and industrial. For all the data sets, annual data were observed within the period of January 1998 to April 2010. The total return indices were collected along this period.

4. Results and Discussions

To assess the performance of indirect property market in Malaysia, at first the returns, risk and sharp ratio were ranked and compared to highlight the significance of property market in Malaysia. Figure I and II present the annualised risk and return profile as well as sharp ratio of the Malaysian portfolio. Generally, all asset classes reveal positive returns including property market. Research done by Ting (1999, 2002) and Kok and Khoo (1995) had shown some adverse results in term of risk-adjusted return for Malaysian portfolio markets. Furthermore, recent analysis done by Newell and Razali (2009) shows that Kuala Lumpur recorded a negative growth over the period 2007-2008 (-45.8%) on listed property performance although some recovery signs since June 2009 (25.3%) was observed. Over this period, Malaysia has seen two economic crises, Asian Financial Crisis (AFC) in 1997/1998 and Global Financial Crisis (GFC) in 2007/2008. Although Malaysia was badly hit by these financial crises, Malaysian portfolios market was still in sustainable growth. Importantly, property market was still a significant contributor to the country's investment portfolio. From the analysis, Malaysian property companies recorded lesser average annual return compared to other portfolios. Moreover, property market risk was among the highest compared to other portfolios. Overall, all portfolios in Malaysia over the period January 1998-April 2010 has shown low risk-less performance which industrial portfolio showing a good performance followed by bonds and finance. With low average annual return and high risk, property market was ranked at last place among all portfolios over this period. Among all portfolios, only bonds showed risk lesser than annual return percentage performance over this period. Obviously property market in Malaysia is still at recover phase from the GFC. This also shows a

relationship with other Asian market such as Singapore, Indonesia, Hong Kong and others Asian market were also badly hit from GFC (Newell and Razali, 2009). Overall, over this period property was ranked at last place in the mix-asset portfolios. This period has shown bond was the best performance in term of risk-adjusted analysis (see figure II). With the challenge of economic crises whether its contribute from local and international situation, the positive growth of all portfolios have shown investment environment in Malaysia specifically in asset classes still attractive in the Asian region.

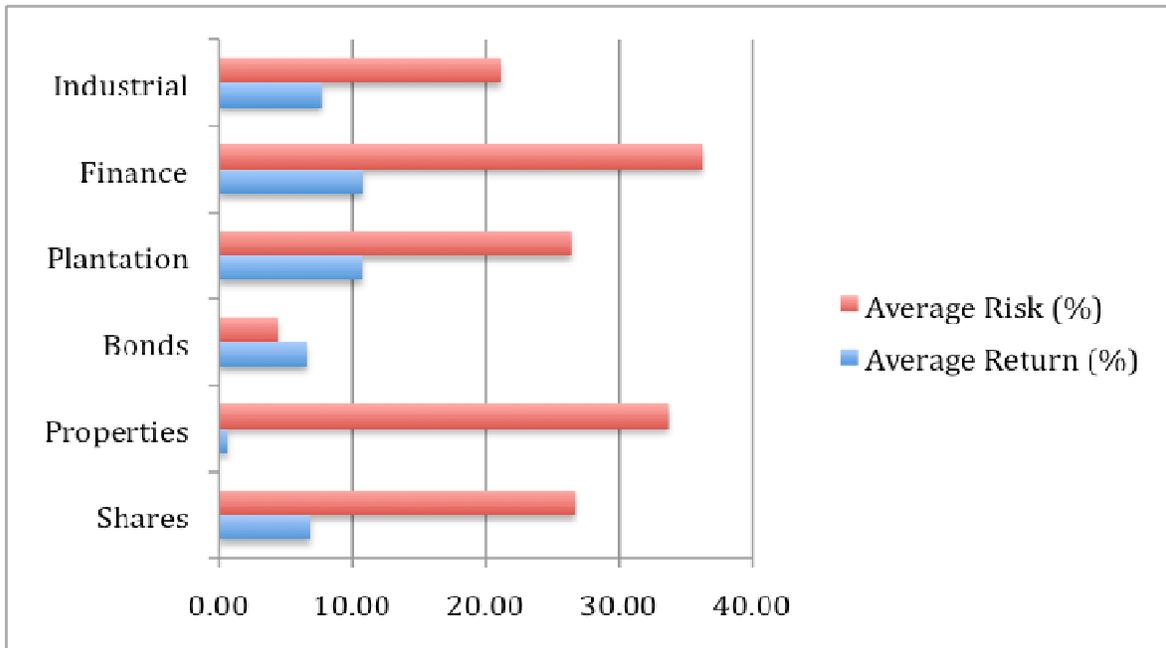


Figure I. Risk and return performance for Malaysian portfolios: Jan 1998-April 2010

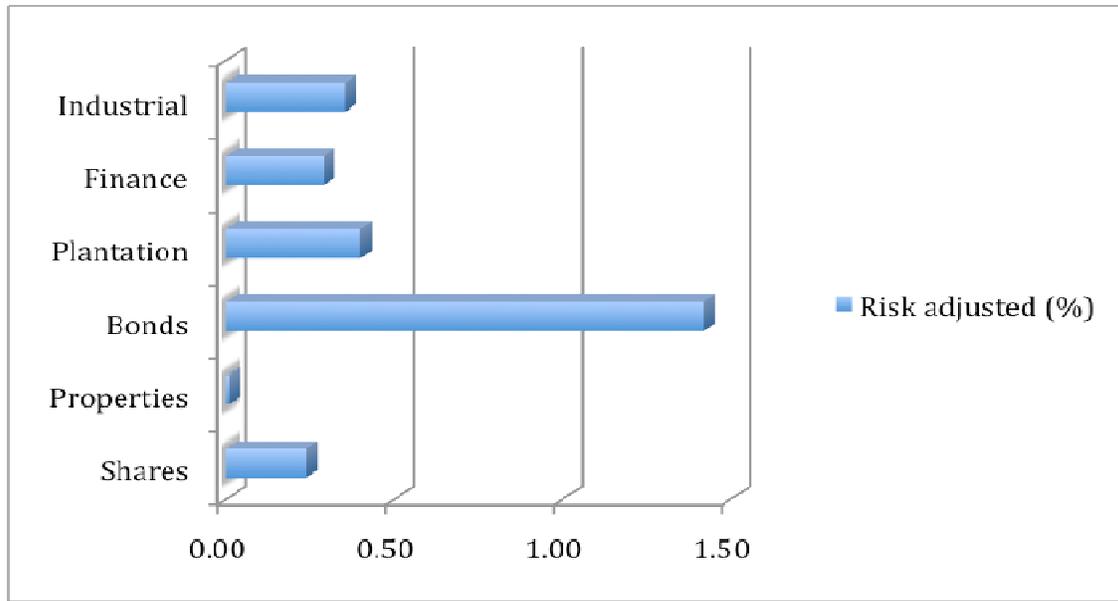


Figure II. Risk adjusted for Malaysian portfolios: Jan 1998-April 2010

In the context of correlation between Malaysian portfolios, majority of assets were significantly correlated with each other except several assets class such as between shares and bonds ($r = 0.26$), property and bond ($r = 0.27$) and bonds with other asset classes namely plantation ($r = 0.17$), finance ($r = 0.27$) and industrial ($r = 0.21$). This indicates the potential significant portfolio diversification for these portfolios in Malaysia for international investors. Some assets are very highly correlated with each other such share and property ($r = 0.87$), share and finance ($r = 0.92$) and share and industrial ($r = 0.94$). This indicates these assets have very little diversification potential. These results are consistent with the analysis by Liow and Adair (2008) but with the different time period. This high correlation in certain portfolios corresponding with Asian markets with high market capitalisation of real estate related firms in the stock market index (Liow and Adair, 2008). Table IV presents the overall results of correlation for Malaysian portfolios market over the period January 1998-April 2010.

Table IV. Correlation matrix for Malaysian portfolios market: January 1998-April 2010

	Share	Properties	Bonds	Plantation	Finance	Industrial
Shares	1.00					
Properties	0.87	1.00				
Bonds	0.26	0.27	1.00			
Plantation	0.77	0.69	0.17	1.00		
Finance	0.92	0.90	0.27	0.62	1.00	
Industrial	0.94	0.82	0.21	0.78	0.82	1.00

Table V presents model of portfolios analysis for different levels of expected return with return and risk. The analysis process involved the mean variance optimal which all portfolios were optimised on a risk-return basis with the underlying set of assets. Similar with research done by Srivatsa *et al.* (2009) the optimal portfolio is computed by picking the portfolio with the maximum sharp ratio and the underlying weighting is used for asset allocation decision.

The results tabulate the optimal portfolios matrix with different levels of expected return and risk based on the changes on the return and risk parameters. With property portfolios in asset classes, it is suggest with the highest portfolio variance (0.54%) and equivalent of annual target return 0.09% consist of 10% in share, 10% in property, 50% in bonds, 20% in plantation, 0% in finance and 10% in industrial while risk indicate 0.43%. And for the minimum variance portfolio (0.27%) with equivalent annual target return 3.50%, it is suggested the proportion for asset classes is 10% for share, 40% for property, 30% for bonds, finance (20%) and industrial (0%). Therefore, the allocations to property portfolios suggested to be situated within a range of 0% up to 40%.

Efficient frontiers of mixed-asset portfolios have been constructed to evaluate the diversification benefits as well portfolio optimisation for all assets. In order to estimate the diversification benefits of property portfolios vs. other portfolios, efficient portfolio and optimal asset allocations are constructed applying data generated from Solver using the risk, returns and correlation data calculated from DataStream over January 1998-April 2010. Figure III present the efficient frontier of a mixed asset portfolio consisting of all portfolios. When property portfolios are added to the portfolio, the addition of another asset class to the mixed-asset portfolio has resulted in significant diversification improvement. It was observed investors could attain 2.73% to 3.70% portfolio return subject to 0.07% to 0.78% portfolio risk. Theoretically, investment that has high risk will provide high return. As such any portfolio with lower return will be disregard. Portfolio on the efficient frontier are optimal in a sense that they offer the highest expected return for some given levels of risk or the lowest possible risk from some given levels of expected return (Hui and Yu, 2010). It was observable that all assets classes in efficient frontier, other assets also play a vital role in their creation. Taking into account lower expected returns, revelation to mix asset is preferable towards higher expected returns. This model reveals the role and importance of property portfolios in Malaysia in term of portfolio optimisation and asset allocation. Overall, property portfolio has gives significant allocation at all risk-return levels. From the diagram it is obvious that when property portfolios are added to the portfolio, the addition of another asset class to the mixed-asset portfolio has resulted in significant diversification improvement.

Furthermore the results also showed that property portfolios could play an important role in Malaysian mix asset portfolios.

Table V. Simulation of the expected return and asset allocation

Weight

Share	Property	Bonds	Plantation	Finance	Industrial	Sum of Weights	Portfolio Variance	Standard Deviation	Target Return
0.20	0.20	0.20	0.20	0.10	0.10	1.00	0.40	0.09	2.73
0.20	0.20	0.40	0.20	0.00	0.00	1.00	0.37	0.14	2.80
0.30	0.30	0.30	0.10	0.00	0.00	1.00	0.34	0.07	2.90
0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.41	0.00	3.00
0.30	0.10	0.10	0.20	0.10	0.20	1.00	0.47	0.07	3.10
0.10	0.10	0.10	0.20	0.20	0.30	1.00	0.48	0.14	3.20
0.40	0.30	0.10	0.10	0.10	0.00	1.00	0.38	0.21	3.30
0.10	0.20	0.20	0.20	0.20	0.10	1.00	0.41	0.29	3.40
0.10	0.40	0.30	0.20	0.00	0.00	1.00	0.27	0.36	3.50
0.10	0.10	0.50	0.20	0.00	0.10	1.00	0.54	0.43	3.60
0.30	0.40	0.20	0.10	0.00	0.00	1.00	0.30	0.78	3.70

Figure III. Efficient frontier for different portfolios: January 1998-April 2010

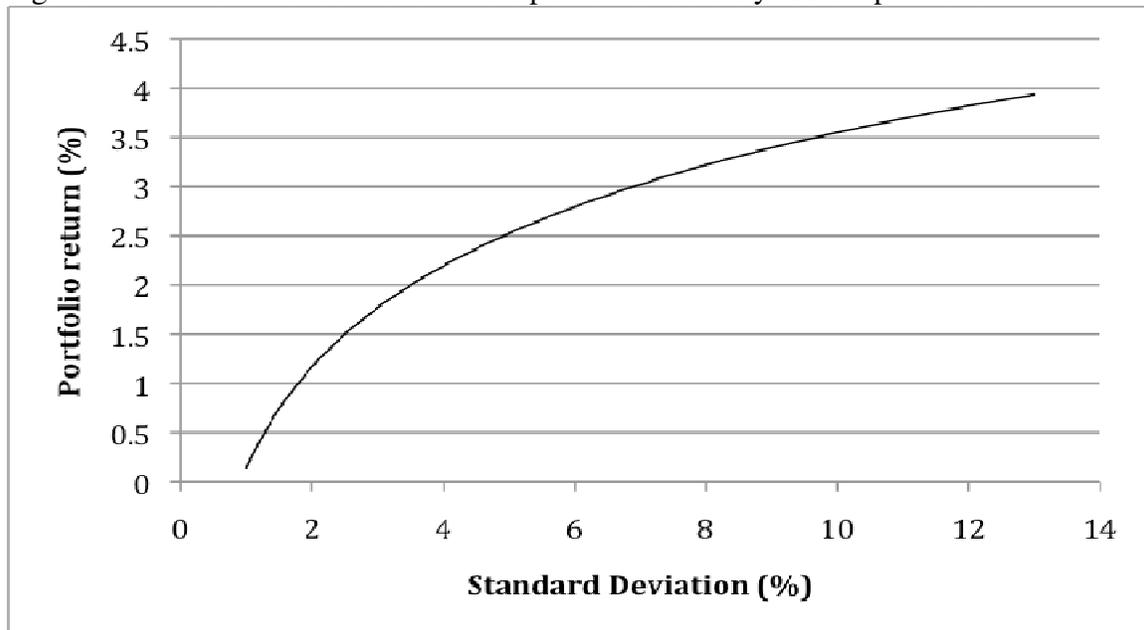
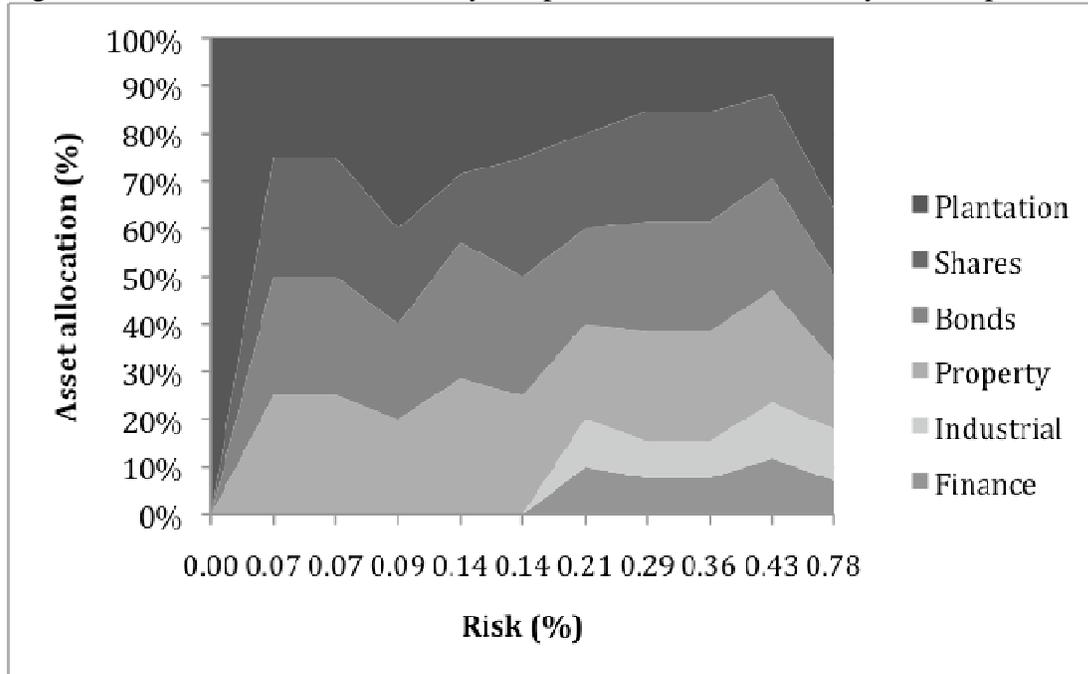


Figure IV presents the asset allocation diagram of a mixed asset portfolio consist of all asset classes in Malaysia over the period January 1998-April 2010. The optimal portfolios in all assets class returns are evident when assess at the standard deviation of the optimal allocation. From the diagram it is apparent others portfolios such as plantation, share and bond dominated upper risk region. All portfolios showed some decrease in risk when it is moving down the portfolio risk spectrum. It is apparent that as the property portfolio allocations increased at the expense of reductions in other portfolios, portfolio risk reduced significantly. The maximum property allocation is at 0.40% with risk 0.36% while minimum allocation is 0% and risk also 0%. Overall, property portfolio sectors have a significant allocation at all risk levels, with the portfolio risk decreases as the allocation of other portfolios increasing.

Overall, property portfolio gives some significant allocation at all risk levels, with the portfolio risk increase as the allocation of property portfolios increasing. All asset classes have given some significant allocation at all risk levels, where the portfolio risk decreases as the allocation of property portfolio increases. The addition of another asset class particularly property portfolio to the mixed-asset portfolio has resulted at least significant although very slightly diversification improvement. When the property portfolio is increasingly added to the portfolio, the portfolio risk has declined. The risk increase from 0.09% to 0.78% as the allocation of property portfolio is slightly raised from 0.10% to 0.40%. Of key importance, for all target returns, the standard deviation decreased with standard deviation horizon. Property portfolio has a large positive allocation for all target returns with the lowest is 0% for target return 3% and ranging up to 40% for target return 3.5%. The proportion of property portfolio increases significantly when the target return increase as well as risk percentage. In addition, the proportion of property in portfolios in average rises for almost all levels of target returns. This analysis shown the benefits of having property portfolios within mix asset portfolio that measures by comparing all major asset classes in Malaysian investment portfolios by given target return and annualised standard deviation.

Figure IV. Asset allocation for Malaysian portfolios market: January 1997-April 2010



6.0 Conclusion

This paper looks into the role of property portfolio in mix asset classes of investment in Malaysian investment market in the context of portfolio optimisation analysis. Over the past 12 years, Malaysia has shown the significant economic growth even though was hit by the Asian financial crisis during 1997/1998 and the global financial crisis in 2007/2008. Nevertheless Malaysia remains major contributor to the financial markets as well as property markets in Asia. This was evidence from the property market investment growth (46% of global property transaction) (RCA, 2010). In addition, being one of the transparent property markets in the world, major international property investors have put Malaysia on the investment radar as an attractive place to invest. Traditionally property always viewed as low risk with good potential of diversification. As such it is very important to model the portfolio optimisation of property portfolios within mix-asset

portfolios in Malaysia. This will benefit the international investors to see the role of local property investment in mix the asset portfolios in the optimisation model point of view.

The main contribution of this paper highlighted the construction of optimal mixed-asset portfolio in the Malaysian portfolios market, significance performance, risk adjusted performance and portfolio diversification benefits over January 1998-April 2010. The portfolio optimisation analyses provide some dependable model and technique. Consequently it provides more accurate result hence examine the role of property portfolios in mixed-asset portfolios. From the diversification benefit point of view, it's indicate that the property companies in Malaysia showed an improvement in recent years even with the increased correlations with other investment portfolios except for bonds and finance. Importantly, the property market in Malaysia has shown extensively enhanced return in recent years, although it is much lower than other asset classes such as shares, bonds and cash. Similar to the risk levels of Malaysia assets, the research showed decreasing risks for all assets except for bonds that remain unchanged. This indicates that Malaysian government through introduction of several policies to overcome financial crises have had some impact. The optimal allocation for all portfolios is around 0% to 100% hence gives some significant allocation at all risk levels.

Overall, this paper has highlighted the portfolio optimisation of property portfolios in mixed asset classes in the Malaysian context. Moreover this paper also investigates enhanced performance and diversification benefits of Malaysian property markets in the local markets. Asian financial crisis and global financial crisis has given significant

impact to property sector in Malaysia. As such these findings will provide some direction especially to the fund managers as well as to any property sector stakeholder in Malaysia. Essentially, asset allocation analysis revealed the property portfolio play a major role in the investment market in Malaysia. As such based on this fact it would be rationale for investors taking into account portfolio optimisation model for property portfolios in Malaysian mix asset portfolios.

Malaysian property market has proven one of the attractive markets especially in Asian region. The increasing flow of foreign direct investment, cross-country transaction and good position in various ranking contribute to the significant growth of property sector in Malaysia. The portfolio optimisation analysis of property market in Malaysia has brought into investment radar especially into the fund managers perspective point of view. The introduction of the recent government policies such as Economic Transformation Plan (ETP), New Economic Model (NEM) and Capital Model Plan (CPM) will provide greater opportunities for fund managers to invest in Malaysian investment market specifically in property market. The analysis proven that property portfolios always have greater role in mix-asset portfolios specifically in Malaysia. Property investment in Malaysia characterise an attractive asset class, which provide the benefits of diversification and therefore performance of mix asset investment portfolios.

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