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Performance and Role of Singapore REITs in Multi-Asset Class Investment Portfolios

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Abstract

In July 2002, the first Real Estate Investment Trust (REITs) was launched publicly on the Singapore Stock Exchange for trading by different investors. Since then, the local REITs market has grown rapidly to reach an estimated market capitalization of SGD 26 billion in April 2007. However, due to its short history in the local investment scene, there were limited research and studies done to investigate the nature and performance of these local financial instruments, i.e. the Singapore REITs or S-REITs. This exploratory research thus seeks to plug this research gap by reviewing the actual performance data of the S-REITs between the period of January 2003 and December 2007. Three major areas relating to the S-REITs were

examined within the scope of this research. First is whether the S-REITs is an asset class comparable to other major or similar asset classes. Second major investigations related to the potential diversification and performance enhancement that S-REITs as an asset class can bring to a multi-asset class investment portfolio of an investor. Finally this research studied the issue of strategic asset allocation within multi-asset class investment portfolios comprising of equities, government bonds and S-REITs. The S-REITs, market is still relatively young and many investors are still learning about the nature and merits of this particular class of investment asset. The results of this research provided some evidences that S-REITs could be considered as a separate asset class when investors look to diversify and strategically better allocate their asset composition within their investment portfolios. While this research attempted to answer several fundamental questions relating to the nature and performance of the S-REITs as an asset class, it is hoped that it will also serve as a platform for other researchers to investigate into related and similar issues of concern as the local S-REITs market continues to grow.

Keywords: Investment portfolio, Diversification of investment, Multi-asset, Investment performance

1. Introduction

Besides equities and bonds, real estate is one of the largest asset investment classes available to investors. They provide the benefits of consistent and predictable cash flow generated through rental incomes, portfolio diversification due to their perceived low correlation of returns with equities and bonds as well as acting as a good hedge against inflation (Imperiale, 2006; Geltner, Miller, Clayton & Eichholtz, 2007). In fact, a well-diversified and appropriately allocated investment portfolio is one whereby real estate asset investments are added to bonds and equities (Frush, 2007). While one can invest directly into real estate assets and gain total control over the invested assets, the vast majority of portfolio investors prefer to gain exposure to the real estate market via the Real Estate Investment Trusts (REITs) due to the latter's advantages of greater liquidity and smaller initial capital outlay (Imperiale, 2006).

Typically structured as commercial entities listed on the local stock exchanges, REITs acquire real estate property assets either within a particular property sector or across different property sectors as part of their diversification strategy (Geltner et al., 2007). Based on the cash flows generated by their underlying real estate assets, REITs generally issue securitized units or shares for subscription by investors usually on a regular basis. Depending on the taxation regime involved, REITs typically distribute most, if not all, of their incomes generated from their real estate holdings to these unit or share holders. Because REITs allow investors to seek higher returns and lower risks within their investment portfolios, they have increasingly become an indispensable part of any well-diversified multi-asset class investment portfolios (Imperiale, 2007).

Numerous studies had been done on the risk and return characteristics of REITs and their diversification benefits for portfolio asset allocation for more than two decades in the more matured REIT markets of the US and Europe as well as the Australian Listed Property Trust (LPT) market where these investment assets have been established since the early 1960s. Being a relatively newcomer to the Asian investment scene, there have been limited empirical researches done on the impact of the risk diversification and performance improvement benefits of Asian REITs and in particular the Singapore REITs on the overall performance of investors' multi-asset class portfolios. REITs provide new investment opportunities for investors to review and improve upon their strategic or long-term asset allocation policies (Idzorek, Barad & Meier, 2006) and therefore it is imperative that more empirical researches be conducted to study the potential contribution of REITs within multi-asset class portfolios in the local investment scene.

2. Literature Review

Real estate has traditionally been identified as one of the main asset classes for investment in portfolio planning (Geltner, Miller, Clayton & Eichholtz, 2007). Its reputation as an inflation hedge and consistent cash flow generator, plus its ability to diversify investors' portfolios due to their low correlation of returns with other asset classes, have made this particular asset category attractive to portfolio investors (Geltner et al., 2007). However, direct investments into the real estate market also usually entail large capital outlays, lengthy lead time to acquire and dispose of the properties as well as intensive involvement in property management activities (Imperiale, 2006; Sing & Ling, 2003).

The recent emergence of REITs in Asia, and in particularly Singapore, has allowed investors to tap into professionally managed portfolios of real estate with strong dividend yields (Ooi, Newell & Sing, 2006). In 2011, a total of 24 S-REITs were listed on the local stock exchange

and the market cap-weighted average S-REIT price rose 35% in the second half of 2009. (REITS around Asia 2H 2009, CBRE Research/Asia). Many S-REITs invested in those properties outside of Singapore. In June of 2007, 21% of S-REIT property value was in real estate of ten countries outside of Singapore. This is relatively high in comparing REITs in other countries.

Given the growing significance of REITs in the context of the Singapore investment scene, it has become crucial that more research be carried out on S-REITs as an investment asset class for benefit of local investors. Unfortunately there had been limited research done to-date on S-REIT as an alternative investment class for the local portfolio investors due to short time frame that the S-REIT market has been operating. This literature review will provide a broad survey of past researches carried out on REITs in foreign markets as well as the few relevant researches done on the Singapore property-related investment sector. The review will also provide a firm background and context for the current research effort into the role of S-REITs, or more specifically into the following questions. Should S-REITs be considered as a separate class of assets for investment? Would S-REITs be able to provide benefits such as portfolio risk diversification and performance improvement to investment portfolios? How could S-REITs form an integral part of an investor's multi-asset investment portfolio?

3. The Role of S-REITs

In investment markets such as the US where REITs have been established for more than forty years, numerous studies had been carried out to examine the risk and return characteristics of the REITs as well as their relationships with other types of investment assets such as equities and bonds. Results and inferences drawn from these studies have not always been consistent and at times, provided contrasting views due to the use of different methodologies or sample data from different time periods (Benjamin, Sirman & Zietz, 2001).

A fundamental concern that is constantly being addressed by different researches is whether REITs should be considered as equities or bonds. Returns from REITs are made up of rental incomes and the capital appreciation of the underlying real estate assets. Earlier studies showed that REIT returns were lower than the equity returns in general (Hartzell, Stivers, Ludgin & Pire, 1999) while they demonstrated lesser volatility than equities at the same time (Clayton & MacKinnon, 2001). The relatively more predictable and stable rental incomes form a significant portion of the REIT's returns as compared to capital appreciation (Hartzell et al., 1999) and, together with the high payout ratios typically required by local regulations governing REITs, have thus provided a more income-oriented feature within REITs (Geltner et al., 2007; Liang and McIntosh, 1998). Also with new tax legislations being put in place in the late 1980s to remove previously-created artificial tax shelters, the US REIT market entered into what many observers considered as the modern REIT era in the early 1990s whereby REITs became more income-driven (Imperiale 2006; Block 2006).

A statistical study regarding the performance of REITs inferred that REITs appeared to offer competitive returns at comparable or even better volatility rates as compared to the other major asset classes over the thirty years between 1975 and 2005. The average annual returns of 13.9% for REITs fared much better than the returns of other asset classes computed based on major price indices. The standard deviations of returns exhibited for REITs over a similar time period were generally lower than equities or stocks, especially for small-capitalization stocks, and higher than bonds (Imperiale, 2006). These findings are in line to those found in many earlier researches conducted earlier.

Another related issue is whether investments into S-REITs are similar to investments into

publicly-listed property companies in Singapore. Both of these indirect property investment vehicles have "high levels of real estate backings whose underlying performance is expected to tie to the property market" (Liow, 1996). Property investment and development firms account for an estimated 15% of Singapore stock exchange capitalization (Liow, 2006). Ooi et al. (2006) postulated that the risk-return characteristics of these two types of indirect property investment vehicles were different due to the constraints of additional regulations governing the S-REITs' operations and dividend policies as well as the diverse ability of S-REITs to offer portfolio investors exposures to specific real estate sectors.

4. The Benefit of S-REITs

From the perspective of a multi-asset portfolio investor, it is important to minimize the possible range of fluctuations in the expected portfolio returns as the "narrowing of the range of outcomes creates an advantage" (Gibson, 2008). The manner to minimize these possible fluctuations in expected portfolio returns is to achieve diversification in the asset holdings with the multi-asset portfolio (Gibson, 2008). The purpose of such diversification is to "reduce the standard deviation of the total portfolio" (Reilly & Brown, 2006).

According to Imperiale (2006), the overall performance of a multi-asset investment portfolio is generally affected by three variables, they are long-term historical and expected rate of return for each asset within the portfolio; volatility of return, or otherwise known as the standard deviation of return, for each of these assets; and correlation of returns between these assets.

One of the major issues in REIT research is the pattern of correlation in returns between REITs and other asset classes (Sing & Ling, 2003). It is the correlation of returns between the different asset classes within an investment portfolio that subsequently determine the degree of diversification benefits achieved within that investment portfolio comprising of different asset classes (Mcginn, Tuttle, Pinti & McLeavey, 2007). Generally, pairs of assets whose returns do not move together provide greater diversification when combined within a portfolio as the volatility of the returns of these assets tends to cancel each other out (Geltner et al., 2007).

According to the statistical results of Imperiale (2006), the low REIT correlation in recent years underscores the ability of REITs to be combined with the other asset classes into portfolios that reduces risk without unduly limiting the portfolio returns. It appeared that REIT assets were generally more highly correlated to equities as compared to bonds, although the degree of correlation varied in different time periods. It seems correlations between REITs and other asset classes are significantly low in recent years, signifying the growing potential diversification benefits of incorporating REITs as an asset class within multi-asset investment portfolios.

One of the main issues associated with this research approach is related to the use of performance data of the Australian LPTs as proxies for the S-REITs. The researchers assumed that the performance of the S-REIT assets would be similar to those of their Australian counterparts. The usefulness of such an assumption is highly questionable as the underlying market structure and economic fundamentals are different between the Australian and Singaporean investment environments.

Considering REITs as a type of equity asset class, it has been concluded that "diversification across equity asset classes with dissimilar patterns of returns mitigated downside risk without resorting to diversification into asset classes with lower expected returns" (Gibson, 2008).

Gibson (2008) thus highlighted that the ability of an asset class' return characteristics to offset another asset class' return characteristics, i.e. the correlation of returns between assets, within a portfolio determine the degree of diversification achieved in terms of reducing that portfolio's volatility or risk level. While it is also argued here that REITs should be considered a major asset class separated from the other types of equity asset class as espoused by Gibson (2008), the important role of REITs in diversifying portfolio risks is undeniably clear.

Studies on the diversification benefits of Asian REITs are almost non-existent due to the obvious reason that REITs are a relatively new phenomenon in the Asian investment markets. Several other research studies have instead been carried out to test and examine the risk diversification benefit of investing into direct real estate from different parts of the world, and in particular the Asia Pacific region, as a separate asset class within a multi-asset or mixed asset portfolio (Jin, Grissom & Ziobrowshi, 2007; Idzorek, Barad & Meier, 2006; Imperiale, 2006; Sing & Ling, 2003). Geltner et al. (2007) highlighted that while REITs typically share similar risk and return characteristics with those of direct real estate investments, it is worthwhile to note the important differences between these two types of investment alternatives.

Firstly, the small values of individual REIT shares provide investors with the opportunities to participate in the real estate market without having to incur large sums of money as compared to buying directly into privately-held real estate assets. Secondly, REIT shares, because of its excellent liquidity, can be efficiently and quickly traded through public stock exchanges at low costs. Finally, REIT investors need not be concerned with the burden of actively managing the underlying real estate assets as they are managed by the REIT's professional management. From the perspective of typical investors, of whom many are smaller players, REITs therefore offer a more attractive investment alternative as compared to direct real estate investments. Geltner et al. (2007, p.130) also noted that passive investors who does not wish to be involved in the management and operation of the underlying real estate assets but yet "interested in the real estate's ability to diversify an investment portfolio" often find such indirect investment vehicles attractive.

Using historical data from 1990 to 2005, Idzorek et al. (2006) also analyzed the performances of multi-asset portfolios comprising of a mixture of six different classes of US equities and bonds, plus real estate assets from North America, Europe and Asia. Between different risk levels ranging from 5% to 15%, they found that the "addition of the three real estate sub-classes to the opportunity set improved efficient asset allocation returns by an average of 182 basis points" (Idzorek et al., 2006) when studying the different historical efficient frontiers created using the available data.

Given the generally similar conclusions drawn by the above studies and that REITs share similar risk-return characteristics of direct real estate assets without most of the latter's limitations, it is logical to suggest that the inclusion of REITs within mixed or multi-asset portfolios should at least lead to similar diversification gains within these portfolios. Ooi et al. (2006) further emphasized that the emergence of REITs in Asia offered new opportunities for investors to "diversify into real estate assets in these Asian countries" and "REITs complement other investment products" within a multi-asset portfolio to reduce risk.

5. Evaluation of S-REITs

Markowitz's mean-variance optimization approach referred to the mathematical process of calculating the range of weights to be assigned to different asset classes within an investment

portfolio in order to achieve maximum expected return for a given level of risk, or the minimum risk for a given expected return (Markowitz, 1959; 1987). Any portfolio which achieves the highest level of return at a given level is called an efficient portfolio (Byrne & Lee, 1995; Gibson, 2008) and the range of risk-return possibilities associated with the set of all possible efficient portfolios is known as the efficient frontier (Geltner et al., 2007). A rational investor would therefore choose portfolios along the efficient frontier (Markowitz, 1959). The inputs needed to compute the asset weights using the mean-variance optimization approach include the assets' expected returns, the expected standard deviations and the covariances of the expected returns between the different assets.

While it is a useful tool to analyse historical performances, the traditional Markowitz's mean-variance optimization approach rarely leads to balanced asset allocations that are intuitively forward-looking, i.e. strategic asset allocations that can be implemented in portfolios to achieve realistic expected returns over the long-term future within acceptable risk limits (Idzorek et al., 2006).

One of the major shortcomings of the traditional Markowitz's mean-variance optimization technique is the high sensitive nature of the asset allocations towards minor adjustments in the inputs used in the optimization calculation, which can potentially lead to possible estimation errors. It had been estimated that estimation errors in expected returns are about ten times as crucial as estimation errors in variances and twenty times as crucial as estimation errors in covariances (Ziemba, 2003). As such, the most critical input to be used in the mean-variance optimization computations is therefore the estimated returns, but at the same time these estimated returns are also the most difficult to estimate (Mcginn et al., 2007).

Thus, it has been noted that the use of mean-variance optimization techniques could potentially lead extreme portfolios whereby some assets take on zero weights while others have large allocations (Black & Litterman, 1992). While portfolios derived from mean-variance optimization techniques are statistically optimal, they are by no means intuitive and acceptable to any prudent portfolio investor due to their extreme asset allocations (Byrne & Lee, 1995). These unreasonable results are due to two well-recognized problems of using the standard mean-variance optimization approach (Michaud, 1989).

Geltner et al. (2007) indicated that if the historical period from which the mean or portfolio return is calculated from can be assumed to be a representative stretch of history, then the historical arithmetic mean will be the best estimate of the ex ante portfolio return, i.e. what the portfolio return will be in any given future single period. However, they also emphasized that the ex ante return, or expected future return may not necessarily equal to the ex post or historical return derived from a given historical sample of returns. Thus Geltner et al. (2007) highlighted that one of the more popular alternative model for deriving the ex ante or expected future return estimates in the capital market is the Capital Asset Pricing Model (CAPM).

Idzorek et al. (2006) attempted to devise a series of balanced multi-asset portfolios using two separate asset allocation approaches, i.e. the Sharpe (1974)'s reversed optimization version of the Capital Asset Pricing Model (CAPM) and the Black-Litterman model. In order to minimize the estimation errors in portfolio expected returns that could hamper the asset allocation computations in these two models, Idzorek et al. (2006) further incorporated the use of Michaud (1998)'s re-sampled mean-variance optimization technique into the development of these two asset allocation models in order to produce two different and robust sets of forward-looking strategic asset allocations.

Generally very little confidence is placed upon the results of a single mean-variance optimisation computation due to the approach's sensitivity to small changes in the values of the inputs used. To overcome this difficulty, some researchers tend to take a statistical view of the efficiency of asset allocation and attempt to generate a robust set of asset allocations through the use of Monte Carlo simulations (Michaud, 1998). Thus other alternative methods commonly used to generate the strategic asset allocations for multi-asset portfolios include the popular CAPM and Black-Litterman approaches.

The Capital Asset Pricing Model (CAPM) is a hypothesis developed by William Sharpe and John Litner that builds on the Markowitz mean-variance portfolio approach with the main purpose of estimating the prices of assets (Fama & French, 2004). Geltner et al. (2007) highlighted that the CAPM has relevant application to real estate investment and in particular, it can be applied to REITs in virtually the same manner as it is being applied to most other sectors of the investment market in general.

Through practical experiences of using the model, Bevan & Winkelmann (1998) and He & Litterman (1999) indicated that the Black-Litterman model help to mitigate against the problem of unintuitive, input-sensitive and highly concentrated portfolios created through the traditional use of mean-variance optimization. Lee (2000) also reported the Black-Litterman model largely reduced the negative impact of error-maximization by spreading any such errors throughout the entire set of expected returns. Thus the Black-Litterman represents a significant quantitative tool for developing a robust strategic asset allocation (Mcginn et al., 2007).

The CAPM and Black-Litterman models continued to be regarded as robust asset allocations and they continued to be used in practice (Mcginn et al., 2007; Idzorek et al., 2006). Thus Idzorek et al. (2006)'s approach to blend the CAPM and Black-Litterman models with Michaud's re-sampling technique to generate stable and balanced strategic asset allocations appeared to be a reasonable one.

6. Methodology

6.1 Types and Sources of Research Data

This quantitative research effort will make use of the financial indices or proxy indices that represent the financial performance of the various investment asset classes being studied here. Therefore the following types of published information made available by the local S-REIT firms, the Singapore Exchange Limited (SGX) as well as the local property consultancies and research houses will be used by this research.

a) The S-REIT unit prices published by the SGX at the end of each month;

b) The market capitalization figures for all publicly-listed S-REITs published by SGX at the end of each month;

c) The different S-REIT firms' listing prospectuses, quarterly and annual financial reports published in compliance to the local regulations;

d) The last-transacted prices of all publicly-listed property companies at the end of each month published publicly by SGX;

e) The various property market reports published by the local property consultancies and research houses.

f) The publicly-published monthly value of the SGX's Straits Times Index and the Government 10-years bonds' price index.

g) The monthly market capitalization values of all equities listed on the SGX as well as the Singapore Government's 10-year bonds.

6.2 Sampling Approach & Data Samples

As the local S-REIT market is still relatively young, the data on the first S-REIT unit is only publicly available from July 2002 onwards. Therefore, this exploratory research will only be able to focus on S-REIT data available over a period of five years from January 2003 until December 2007. Also, due to the need of ensuring that the analysis made by this research is meaningful, only S-REIT firms with a sufficiently long track record are included within the scope of this research. Therefore it is proposed that only S-REIT firms which have been publicly listed for a minimum of six months will be included as part of this research's study sample. For this particular reason, only the following sixteen S-REIT firms will be included within this research's scope:

Table 1. List of S-REITs with a Minimum of Six Months Track Record from December 2007

Name of Listed S-REIT	**Date of Listing**	**Market Sector**
CapitaMall Trust	Jul 2002	Retail
Ascendas REIT	Nov 2002	Industrial
Fortune REIT	Aug 2003	Retail (Hong Kong)
CapitaCommercial Trust	May 2004	Office / Retail
Suntec REIT	Dec 2004	Mixed Commercial
Mapletree Logistic REIT	Jul 2005	Logistics
Macquarie MEAG Prime REIT	Sep 2005	Office / Retail
Allco Commercial REIT	Mar 2006	Office / Retail
Ascott REIT	Mar 2006	Commercial
K-REIT Asia	April 2006	Commercial
CDL Hospitality REIT	Jul 2006	Hotels
Cambridge Industrial Trust	Jul 2006	Industrial
Frasers Centrepoint Trust	Jul 2006	Retail
CapitaRetail China Tust	Dec 2006	Retail (China)
First REIT	Dec 2006	Healthcare
MacarthurCook Industrial REIT	April 2007	Industrial

6.3 Hypotheses

According to the literature review about the role, benefits and evaluation of S-REIT, the following six hypotheses were constructed and being tested in this study.

Hypothesis 1a: *The return levels of S-REITs are generally closer to equities as compared to*

bonds, while the degree of volatility of S-REIT returns is higher than bonds but generally lower than equities.

Hypothesis 1b: *The risk-return characteristics of S-REITs and publicly-listed property companies in Singapore are different.*

Hypothesis 2a: *The S-REITs exhibit a closer correlation of returns with Singapore equities as compared to government bonds, but are sufficiently low enough to achieve diversification within multi-asset portfolios.*

Hypothesis 2b: *The S-REITs as an asset class provides better diversification benefits to multi-asset portfolios as compared to those achieved by the publicly-listed property companies in Singapore.*

Hypothesis 3a: *The traditional Markowitz's mean-variance optimization approach towards generating strategic asset allocation does not generally provide a robust and balanced allocation that can be used by investors to structure their multi-asset class portfolios.*

Hypothesis 3b: *The strategic asset allocations created by other models such as the Capital Asset Pricing Model (CAPM) and the Black-Litterman model, and enhanced through Michuad's re-sampling technique, will generally provide a more balanced and optimally-structured multi-asset portfolios comprising of Singapore equities, government bonds and S-REITs as compared to the type of asset allocations based on the traditional Markowitz mean-variance optimization.*

7. Research Analytical Approach

Details of the data analytical strategy that will be adopted for each category of the research question and hypotheses are being described below.

7.1 Computation of Descriptive Statistics & Analyses of Financial Characteristics of the S-REIT Asset Class

Besides calculating and examining the various descriptive statistics relating to the returns and risks of the financial performance of S-REIT units in terms of their means and variances, comparison and analyses will also be made between the performance of these S-REITs and the Singapore equities, government bonds and the publicly-listed property companies in the following manner:

a) The graphs depicting the monthly historical returns of the major asset classes between January 2003 and December 2007 will be plotted to provide the broad context for this financial research. The major asset classes will include the Singapore equities, government bonds, publicly-listed property companies and the S-REITs.

b) Numerical tables showing and comparing the ex-post risk and return figures for S-REITs, the local equities index, selected local property stock indices as well as the Singapore government's long-term bond indices.

c) The correlation coefficient ratios between the S-REIT asset class and each of the other asset classes, i.e. Singapore equities, government bonds and publicly-listed property companies, will be calculated will also be plotted for further analyses.

d) Graphs showing the general time-series trends of the financial performances of S-REITs, local equities, government bonds and publicly-listed property companies will also be plotted and analysed.

7.2 Analyses of Risk Diversification and Performance Improvement of S-REITs within Multi-Asset Class Investment Portfolios

The following analyses will be carried out:

a) To discover the potential of the S-REITs asset class to provide diversification benefits, the efficient frontiers for the following types of portfolios will be constructed:

i. Portfolios that consist of only the equities and the government bonds asset classes;

ii. Portfolios containing equities, government bonds and the S-REITs asset classes.

b) To compare the potential of the S-REITs asset class to provide diversification benefits as against the asset class of the publicly-listed property companies, the efficient frontiers for the following types of portfolios will be constructed:

i. Portfolios that consist of equities, government bonds and the publicly-listed property companies asset classes;

ii. Portfolios containing equities, government bonds and the S-REITs asset classes.

c) The constructed efficient frontiers will be used to not only analyse the potential diversification gains achievable with the inclusion of S-REIT asset class within a multi-asset investment portfolio, they will also be used to determine the possible improvement in return performance for that particular portfolio (Gibson, 2008; Maginn, Tuttle, McLeavey & Pinto, 2007).

7.3 Computation and Analyses of Asset Allocations Between Major Asset Classes within Multi-Asset Class Investment Portfolios

The following analytical steps will be performed:

a) The asset allocation chart using the traditional Markowitz's mean-variance approach will be graphed to how the proportions allocated to the Singapore equities, government bonds and the S-REIT asset classes changes at different levels of historical returns.

b) The efficient frontiers for the portfolios with forward-looking asset allocation for S-REITs, equities and government bonds generated by the CAPM and the Black-Littleman models will be constructed and analysed.

c) The asset allocations charts for the CAPM and Black-Litterman models will also be plotted to demonstrate the rate of change in the asset weights or proportions being assigned to different asset classes within a multi-asset portfolios over a range of expected portfolio returns. These asset allocations will also be compared to those generated by the traditional Markowitz's mean-variance approach.

d) The asset allocation charts for the CAPM and the Black-Litterman models after applying Michaud's re-sampling technique using 100 iterations will also be plotted. These charts will be used to compare with those asset allocation charts prior to applying the re-sampling technique to identify any possible improvements or differences resulting from the use of Michaud's re-sampling technique.

8. Findings

Table 2 below highlights the various statistics computed for the major asset classes identified within the scope of this research effort, i.e. the risk and return statistics for the equities,

government bonds, S-REITs and the publicly-listed property companies within the Singapore investment market between the period of January 2003 and December 2007.

Table 2. Summary Statistics of Singapore Asset Classes (Between January 2003 and December 2007)

Asset Class	ST Index (Equities)	Singapore Government 10-year Bond (SG-Bonds)	Singapore Real Estate Investment Trusts (S-REITs)	Singapore Exchange All Properties (Publicly-Listed Property Companies)
Mean Monthly Return (%)	1.65	0.04	1.81	2.60
Standard Deviation of Returns (%)	3.45	2.60	4.76	6.11
Variance of Returns	0.00119	0.00067	0.00227	0.00373
Risk Adjusted Returns (Sharpe Ratio) based on monthly risk-free rate of 0.33%	0.382	-0.113	0.310	0.371

The highest historical mean monthly return is registered for the publicly-list property companies at 2.60%, followed by S-REITs at 1.81%, equities at 1.65% and finally the government bonds at 0.04%. Similarly, the standard deviation of the monthly returns asset class for the publicly-listed companies registers the highest value at 6.11%, followed by S-REITs at 4.76%), equities at 3.45% and the government bonds at 2.6%. Reflecting on these statistics for these asset classes, it appears that the higher the monthly returns, the higher the standard deviation and vice versa as well. Since the standard deviation statistics measures the risk or volatility associated with the various asset classes, it seems that conventional wisdom of asset classes with high returns will normally carry higher level of risks while asset classes with lower returns will carry lower level risks (Geltner et al., 2007).

Using a monthly risk-free rate of 0.33%, the Sharpe ratio is highest for equities at 0.382, followed by the publicly-listed property companies at 0.371, S-REITs at 0.310 and finally the government bonds at -0.113. Since the Sharpe ratio is a measure of the amount of excess returns over the risk-free rate relative to the risk of the asset involved, it provides an indication of how well the asset has performed financially during the time period on which the statistics were computed. Thus between the period of January 2003 and December 2007, the equity asset class has provided the best financial performance and was followed closely by the publicly-listed property companies and S-REITs. The government bond asset class, with its negative Sharpe ratio, has done poorly during this same time period.

The risk-return statistical computations showed that the average historical return of the S-REIT asset class at 1.81% is closer to the equity asset class' 1.65% monthly return than as compared to 0.04% return generated by the government bonds. However, the level of risk or volatility at 4.76% experienced by the S-REIT asset class' historical returns is not only higher than the government bonds' 2.60%, but also higher than the equity asset class' 3.45%. The latter findings on the volatility rate differ from those generally found in the more mature REIT markets such as the US whereby the volatility rate of their REITs is reportedly lower than their equity asset class (Imperiale 2006).

From the perspective of historical financial performance, it does appear that the S-REIT asset class on the whole resembled more closely with the equity asset class, as compared to the government bond asset class. Thus this particular hypothesis about the closer resemblance of S-REITs with the equity asset class rather than the government bonds is generally supported by the above relevant empirical evidences. **Hypothesis 1a**: The return levels of S-REITs are generally closer to equities as compared to bonds, while the degree of volatility of S-REIT returns is higher than bonds but generally lower than equities is supported.

Based on Table 2, the average historical monthly return generated by the S-REIT asset class at 1.81% is lower than the 2.60% historical monthly return provided by the publicly-listed property companies, i.e. the monthly returns of S-REITs is about 30% lower than those of the publicly-listed property companies. However, the level of volatility or risk for the S-REIT asset class is also corresponding much lower than the publicly-listed property companies at the same time. Using the monthly risk-free of 0.33%, the Sharpe ratio of the S-REIT asset class at 0.310 is about 16% lower than the figure of 0.371 computed for the publicly-listed property companies.

These computed figures thus provide the statistical evidences that the historical financial performances of the S-REITs and publicly-listed property companies are generally different enough to be considered as two separate asset classes. As such, **Hypothesis 1b**: The risk-return characteristics of S-REITs and publicly-listed property companies in Singapore are different is supported.

Tables 3 and 4 below highlight the correlation coefficient and covariance statistics between all the four asset classes being researched. These two statistics show the degree in which the monthly returns of two assets or asset classes tend to move together in the same direction over time.

Table 3. Correlations of Monthly Returns Between Different Asset Classes (Between January 2003 and December 2007)

Correlation Coefficients	ST Index (Equities)	Singapore Government 10-year Bond (SG-Bonds)	Singapore Real Estate Investment Trusts (S-REITs)	Stock Exchange Singapore All Properties (Publicly-Listed Property Companies)
ST Index	1.0000	-0.2060	0.4665	0.7220
SG-Bonds	-0.2060	1.0000	0.1082	-0.0565
S-REITS	0.4665	0.1082	1.0000	0.4342
All Properties	0.7220	-0.0565	0.4342	1.0000

Table 4. Covariance between Monthly Returns of Different Pairs of Asset Classes (Between January 2003 and December 2007)

Variance-Covariance Matrix	ST Index (Equities)	Singapore Government 10-year Bond (SG-Bonds)	Singapore Real Estate Investment Trusts (S-REITs)	Stock Exchange Singapore All Properties (Publicly-Listed Property Companies)
ST Index	0.00119	-0.00018	0.00077	0.00152
SG-Bonds	-0.00018	0.00067	0.00013	-0.00009
S-REITS	0.00077	0.00013	0.00227	0.00069
All Properties	0.00152	-0.00009	0.00069	0.00373

The correlation and covariance statistics in the above tables revealed that the monthly returns of the government bond asset class are negatively correlated with those of the equity and the publicly-listed property company asset classes while it is only marginally correlated with the monthly returns of the S-REIT asset class. The monthly returns of the equities asset class are positively correlated with both those of the S-REIT and publicly-listed property company asset classes. However, the monthly returns of the equity asset class is much more closely and significantly correlated with the monthly returns of the publicly-listed property company asset class as compared to those of the S-REIT asset class. Finally, the historical monthly returns of the S-REIT asset class are somewhat positively correlated to those of the publicly-listed property company asset class with a correlation coefficient of 0.4342. The positive correlation between these two asset classes is unsurprising given that the returns associated with both of these asset classes are largely driven by their underlying real estate

assets.

Given the above results that the S-REIT asset class is not perfectly correlated with the asset classes of the equities and government bonds, i.e. the correlation coefficient is less than 1, Brueggeman & Fisher (2008) and Gibson (2008) highlighted that reduction in the volatility or risk levels and even some degree of financial performance improvement in portfolios made up of different combination of these asset classes will be possible. Figure 1 below shows the computed efficient frontiers for two different investment portfolios. The efficient frontier depicting the 3-asset portfolio is made up of different combination of equity, government bond and S-REIT asset classes while the efficient frontier for the 2-asset portfolio is made up of only equities and government bonds.

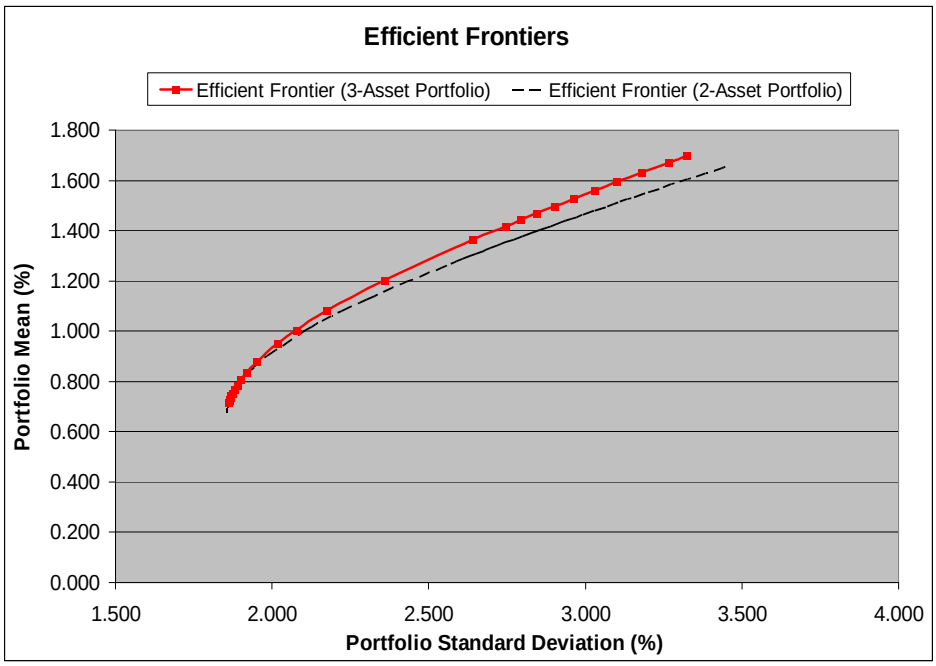

Figure 1. Comparing the Efficient Frontiers of a 2-Asset Portfolio (Equities & Bonds) and a 3-Asset Portfolio (Equities, Bonds & S-REITs)

Figure 1 shows that between the historical portfolio standard deviations of 1.86% to 3.30%, the 3-asset portfolio achieved a portfolio mean returns of between 0.72% and 1.70% as compared to the portfolio mean returns of between 0.72% and 1.63%. Figure 1 clearly shows that the 3-asset portfolio dominates the 2-asset portfolio between the ranges of portfolio deviations indicated. More specifically, the inclusion of the S-REIT asset class into a multi-asset class portfolio that also comprises of equity and government bond asset classes help that portfolio to reduce its volatility or risk levels while at the same time increases its mean monthly return at every level of risk between the standard deviations of 1.86% to 3.30%.

The correlation coefficient and covariance computations between the S-REITs and the other asset classes of equities and government bonds proved that the S-REITs as an asset class historically exhibited a closer correlation in terms of returns with equity asset class as compared to the government bonds. However, the degree of correlation between the S-REITs and the asset classes of equities and government bonds was sufficiently low enough to allow the S-REITs as an asset class to provide diversification benefits within multi-asset portfolios.

As emphasized in the research carried out by Jin et al. (2007), the addition of real estate

assets at moderate risk levels would be able to provide significant efficiency gains to the multi-asset investment portfolios due to its low correlation with other financial assets. Between the portfolio standard deviations of 1.86% and 3.30%, Figure 1 thus supports the **Hypothesis 2a:** The S-REITs exhibit a closer correlation of returns with Singapore equities as compared to government bonds, but are sufficiently low enough to achieve diversification within multi-asset portfolios.

To further compare the diversification and performance benefits of S-REITs as an asset class as against the publicly-listed property companies, Figure 2 shows the efficient frontiers of two different 3-asset portfolios. One investment portfolio comprises of equities, government bonds and S-REITs while the other portfolio comprises of equities, government bonds and publicly-listed property companies.

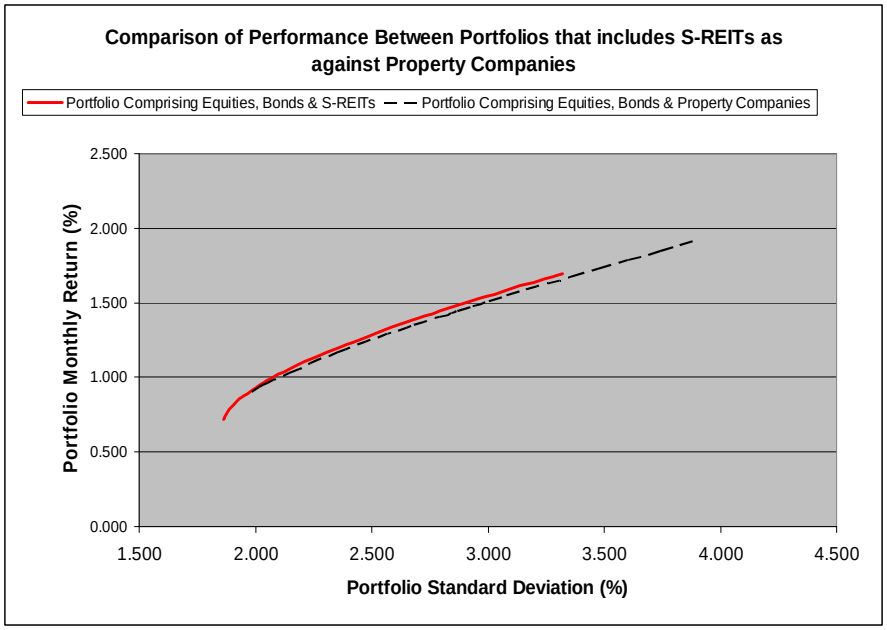

Figure 2. Comparing the Efficient Frontiers of 3-Asset Portfolios that includes S-REITs as against Publicly-Listed Property Companies

As shown in Figure 2, the efficient frontier representing the 3-asset portfolio that included the publicly-listed property companies produced a portfolio mean return ranging from 0.95% and 1.85% between the portfolio standard deviations of 2.03% and 3.74%. Comparing with the efficient frontier for the 3-asset portfolio that included the S-REIT asset class, three inferences could be made. Between the portfolio standard deviations of 2.03% and 3.30%, the 3-asset portfolio that included the S-REITs dominated the other 3-asset portfolio that included the publicly-listed property companies, i.e. a higher range of portfolio returns between 0.98% and 1.67% were achieved by the former portfolio as against the 0.95% to 1.64% achieved by the latter portfolio. The global minimum-variance portfolio on the efficient frontier of the 3-asset investment portfolio that included the S-REIT asset class at the standard deviation of 0.72% was clearly much lower than the 2.03% achieved by the efficient frontier of the 3-asset portfolio that included the publicly-listed property companies. However, beyond the portfolio standard deviation of 3.30% and up to 3.74%, the asset class of the publicly-listed property companies would be able to continue to provide further diversification and performance improvement benefits to a multi-asset investment portfolio, unlike the S-REIT asset class.

While the efficient frontier for a multi-asset investment portfolio comprising of the S-REIT

asset class produced a lower global minimum-variance portfolio as compared to that generated through the inclusion of publicly-listed property companies, the latter was able to provide diversification benefits for portfolios with larger standard deviation, i.e. higher volatility or risk levels. Figure 2 therefore supports the **Hypothesis 2b:** The S-REITs as an asset class provides better diversification benefits to multi-asset portfolios as compared to those achieved by the publicly-listed property companies in Singapore that the S-REITs as an asset class is able to achieve a better diversification effect within multi-asset investment portfolios between the portfolio standard deviations ranging between 2.03% and 3.30% as compared to that achievable through the inclusion of publicly-listed property companies. However, the publicly-listed property company asset class is likely to provide more aggressive investors with some degree of potential diversification benefits at a higher range of portfolio volatility.

Figure 3 below shows the historical asset allocation computed based on the traditional Markowitz's mean-variance optimization approach. Between the range of 0.71% and 1.79% portfolio monthly return, the changes seen in the proportions of asset classes within the portfolio comprising of equities, government bonds and S-REITs appeared to be sudden and fairly steep.

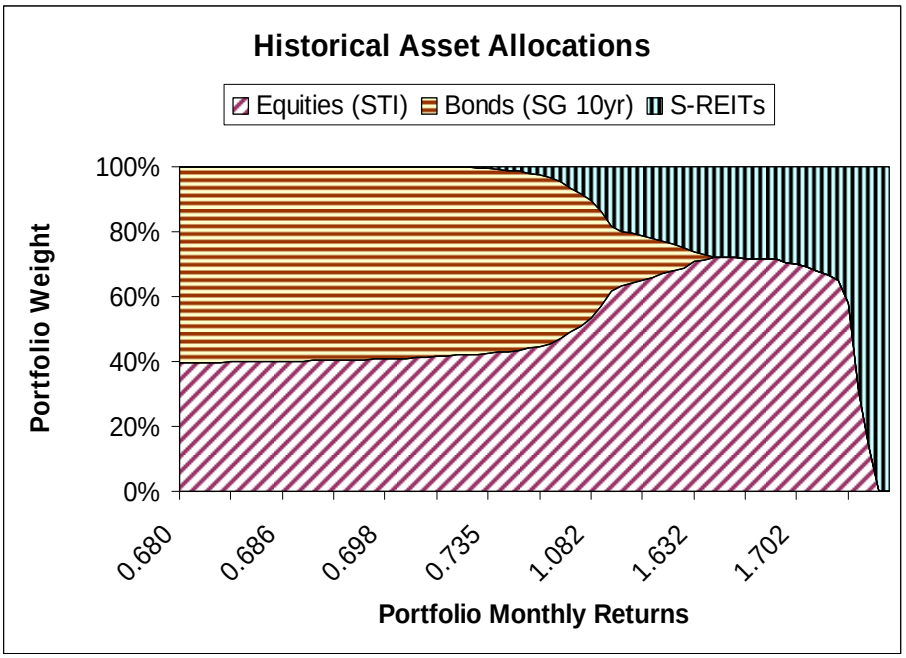

Figure 3. Strategic Asset Allocation for a Multi-Asset Class Investment Portfolio Based on Traditional Markowitz's Mean-Variance Optimization

Based on Figure 1 above, for portfolios with the monthly returns between 0.68% and 0.71%, the Markowitz's approach produced an asset allocation that for Singapore equities, the allocated weight increased from about 39.7% to 41.9%; for the government bonds, the allocated weight decreased from about 60.3% to 58.1%; and no weight has been allocated to the S-REIT asset class. For portfolios with the monthly returns between 0.71% and 1.79%, the following patterns of asset allocation were generated that for Singapore equities, the allocated weight increased from 41.9% to 72.0% between the monthly portfolio returns of 0.71% and 1.70%, and he allocated weight decreased rapidly from 72.0% to 0% between the monthly portfolio returns of 1.70% and 1.79%. For the government bonds, the allocated weight to this particular asset class decreased from 60.3% to 0% between the monthly

portfolio returns of 0.68% and 1.68% and for the S-REIT asset class, the allocated weight within the portfolio increased from 0% to 100% with this short range of monthly portfolio returns. The rate of increase appeared to increase significantly after the monthly return exceeded 1.72%. Thus for values of monthly portfolio returns exceeding 1.79%, the portfolios using the traditional Markowitz's mean-variance approach would consist of the S-REIT asset class only.

The apparently extreme changes seen in the asset allocations of the different major asset classes over a short range of monthly returns highlighted the instability of the asset allocations generated by the Markowitz's mean-variance approach. Therefore, we can conclude that the use of financial information from other matured REIT market as a proxy to forecast asset allocation for investment portfolios for the Singapore market is not necessarily a reliable method of doing so. Also, the uneven and unstable patterns seen in the above asset allocations do appear to support this hypothesis and the notion that "the traditional Markowitz's optimization approach rarely leads to robust forward-looking asset allocations" (Idzorek et al., 2006). So **Hypothesis 3a:** The traditional Markowitz's mean-variance optimization approach towards generating strategic asset allocation does not generally provide a robust and balanced allocation that can be used by investors to structure their multi-asset class portfolios is supported.

To devise a series of more balanced and robust asset allocations for a multi-asset investment, the Capital Asset Pricing Model (CAPM) and the Black-Litterman model have been recommended as suitable (Benninga, 2008; Mcginn et al., 2007; Idozerk et al,. 2006). In order to test and determine the suitability of using these two models in strategic asset allocation in the current research context, the efficient frontiers and the asset allocations were generated using the suggested approach by Benninga (2008) through incorporating the various historical financial and current market capitalization data into the frameworks of these two models.

For the purpose of demonstrating the capabilities of the CAPM and Black-Litterman models, these asset allocations were generated using a monthly risk-free rate of 0.33%, an anticipated benchmark monthly return of 1% and an investor's view that the future performance of the S-REIT asset class will be similar to its historical levels at 100% confidence level. Table 5 below showed the various market capitalization data, the computed CAPM expected returns or otherwise known as the equilibrium market returns as well as the Black-Litterman view-adjusted returns (Benninga, 2008).

Table 5. Computed CAPM Equilibrium Market Returns And Black-Litterman View-Adjusted Returns Using Benninga (2008)'s Suggested Approach

	Equities	**Government Bonds**	**S-REITs**
Market capitalization (in millions)	766,025	65,200	24,608
Market benchmark proportions	89.51%	7.62%	2.88%
Equilibrium market returns (CAPM)	1.07%	0.26%	0.85%
Black-Litterman view-adjusted returns	1.68%	0.45%	1.81%

Relying on the above computed equilibrium market returns or the CAPM expected returns, an efficient frontier as shown in Figure 4 below has been constructed using the typical mean-variance optimization technique.

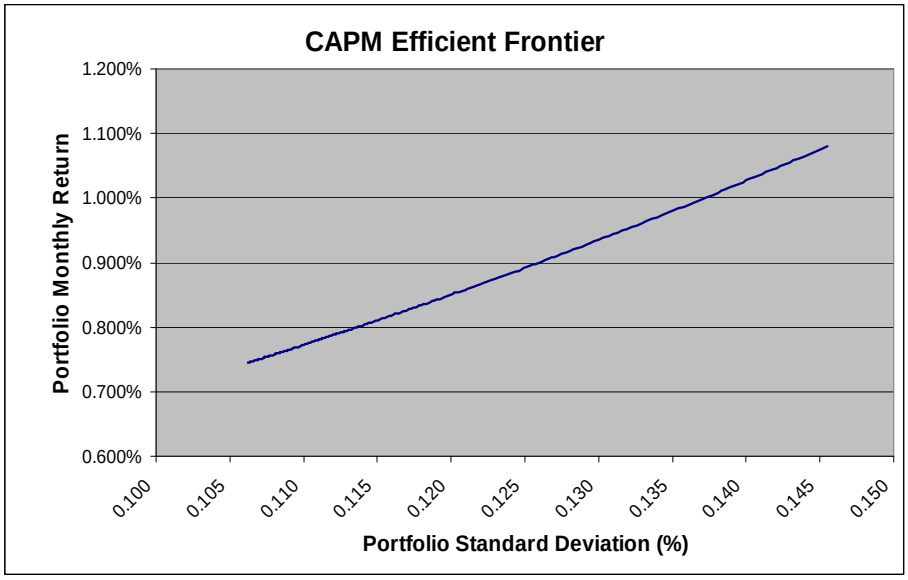

Figure 4. The CAPM Efficient Frontier Using Market Capitalization Values As Allocated Weights for Different Assets

Figure 5 below showed the asset allocation chart generated based on the CAPM expected returns.

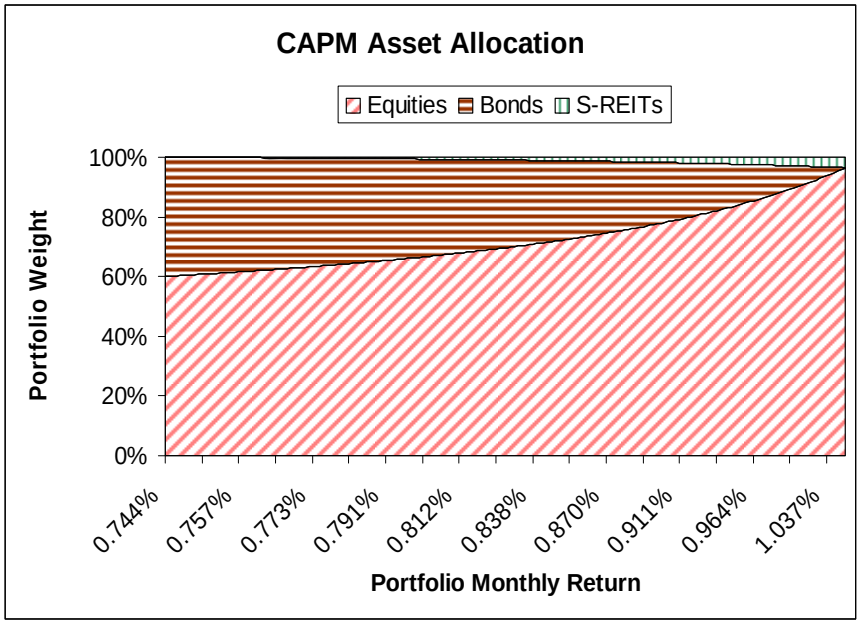

Figure 5. The Asset Allocation Based on the CAPM Expected Returns

As the portfolio monthly return increases from 0.74% to 1.06%, the asset allocation chart in Figure 5 highlighted that the asset weight allocated to the S-REIT asset class gradually increased from 0% to about 3.6%; the asset weight allocated to the equity asset class also gradually increased from 60.0% to about 96.4% and however, the asset weight allocated to the government bond asset class gradually reduced from 40.0% to 0%;

Using the CAPM equilibrium returns as the key anchoring point within its approach, the ability of the Black-Litterman model to incorporate the investor's views about future performance of the assets or asset classes within a portfolio at different degrees of confidence is one of its recognized strengths (Mcginn et al., 2007). Using the scenario that an investor holds the view that the future performance of the S-REIT asset class will continue to be similar to its historical levels, Table 6 below showed the asset weights computed using Benninga (2008)'s approach that would be allocated to each of the three asset classes in accordance to the different levels of conviction or confidence in the view that is being held by the investor.

Table 6. Black-Litterman Asset Allocations Based On Investor's Level Of Confidence

Confidence Level of Investor's View	Equities (%)	Government Bonds (%)	S-REITs (%)
0%	89.51	7.62	2.88
5%	88.03	8.39	3.58
10%	86.55	9.17	4.29
15%	85.07	9.94	4.99
20%	83.59	10.71	5.70
25%	82.11	11.49	6.41
30%	80.63	12.26	7.11
35%	79.15	13.04	7.82
40%	77.67	13.81	8.52
45%	76.19	14.58	9.23
50%	74.71	15.36	9.94
55%	73.23	16.13	10.64
60%	71.75	16.91	11.35
65%	70.27	17.68	12.06
70%	68.79	18.45	12.76
75%	67.31	19.23	13.47
80%	65.82	20.00	14.17
85%	64.34	20.77	14.88
90%	62.86	21.55	15.59
95%	61.38	22.32	16.29
100%	59.90	23.10	17.00

At 0% confidence level, the investor basically expects that future returns of the different major asset classes will match those of the CAPM equilibrium returns, thus Black-Litterman strategic asset allocations will follow those of the CAPM asset allocations, i.e. the equities, government bonds and S-REIT asset class will be allocated the weights of 89.51%, 7.62% and 2.88% respectively. At 100% confidence level in the view that the expected return of the S-REIT asset class will be similar to its historical rate of return, the Black-Litterman strategic asset allocation for the equities, government bonds and S-REIT asset classes will be 59.90%, 23.10% and 17.00% respectively. Depending on the investor's degree of confidence in the view held, the actual strategic asset allocation will fall in-between the two strategic asset allocations of 0% and 100% confidence levels in the investor's view.

Figures 6 and 7 below showed the Black-Litterman view-adjusted efficient frontier as well as the asset allocation chart computed that incorporated the investor's views about the likely future performance of S-REIT asset class at 100% confidence level.

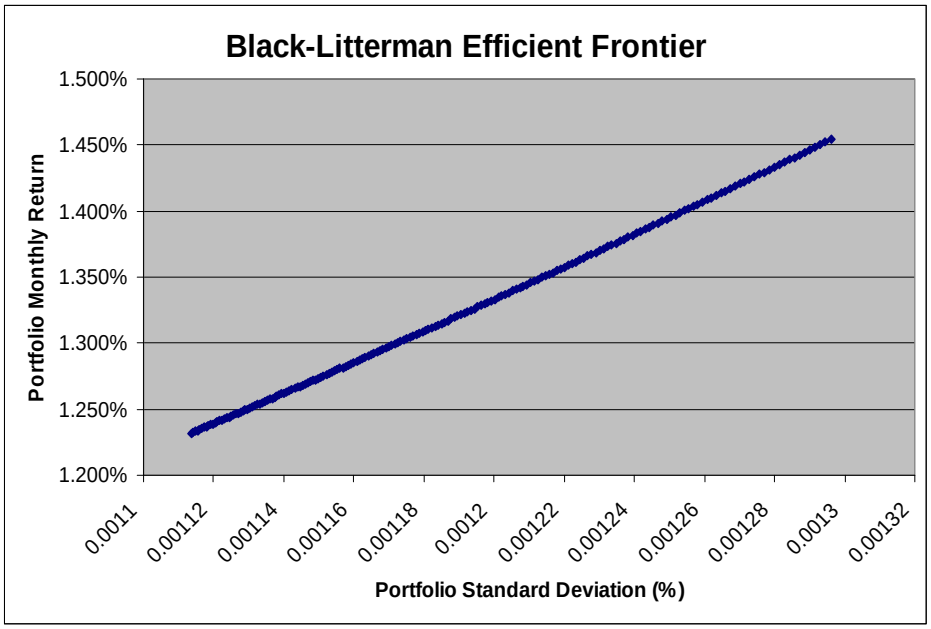

Figure 6. The Black-Litterman View-Adjusted Efficient Frontier

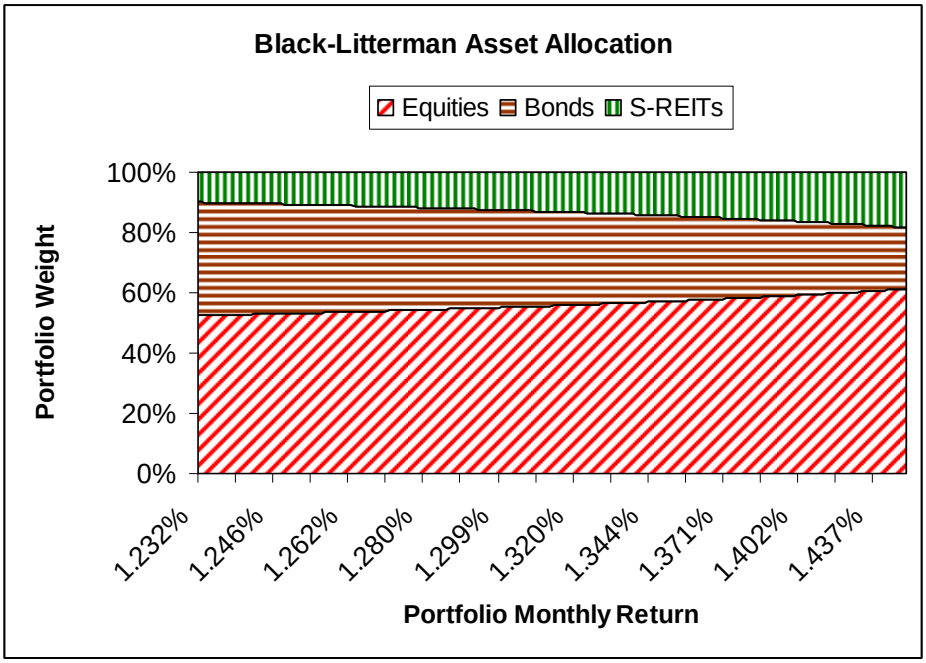

Figure 7. The Asset Allocation Chart Based On Black-Litterman's View-Adjusted Returns

Based on Figure 7 above, it can be seen that as the portfolio monthly return increases from 1.23% to 1.45%, the asset allocation chart highlighted that the asset weight allocated to the S-REIT asset class gradually increased from about 9.9% to 18.3%; the asset weight allocated to the equity asset class also gradually increased from 52.4% to about 61.3%; and the asset weight allocated to the government bond asset class however gradually decreased from 37.6% to about 20.5%;

The examples of asset allocations generated using the CAPM and Black-Litterman models showed a fairly consistent degree of stability in terms of asset weights allocated to different

asset classes and better diversification over the range of portfolio monthly returns highlighted. Therefore these examples appear to support the hypothesis that models such as the CAPM and Black-Litterman tend to produce more stable and robust asset allocations as compared to the traditional Markowitz's mean-variance approach. However, while some slight improvements were detected to the CAPM and Black-Litterman asset allocation examples when the Michaud's re-sampling technique was being applied, the potential degree and nature of such improvements remain fairly unclear. **Hypothesis 3(b)**: The strategic asset allocations created by other models such as the Capital Asset Pricing Model (CAPM) and the Black-Litterman model, and enhanced through Michuad's re-sampling technique, will generally provide a more balanced and optimally-structured multi-asset portfolios comprising of Singapore equities, government bonds and S-REITs as compared to the type of asset allocations based on the traditional Markowitz mean-variance optimization is supported.

9. Discussion

9.1 Contributions

This research demonstrated that the nature and characteristics of the S-REITs as an asset class differed significantly from the other major asset classes, namely the equities, government bonds and publicly-listed property companies. Being able to recognize and understand these differences will provide an investor with the knowledge and insights to tap on while attempting to build a balanced and well-diversified multi-asset investment portfolio. An informed investor will also at the same time be aware that the financial performance characteristics of different asset classes may change over time and thus need to continuously monitor these asset classes as the market evolves and matures over time. The research framework and processes used in this exploratory research thus provide investors and researchers alike with a robust approach to study emerging new assets or asset classes as well as the continuous evaluation of existing ones within the local investment market.

The results of this research in particular threw the spotlight on the importance for investors to achieve risk diversification and performance improvement within multi-asset class investment portfolios through the inclusion of assets or asset classes with financial performance characteristics that differ from the existing types of assets or asset classes in those portfolios. More specifically, this research highlighted the critical role that the S-REIT asset class, being a relatively new investment instrument in the local market, can play as compared against other asset classes in generating such benefits as risk diversification and performance improvements within multi-asset class portfolios.

This exploratory research has validated the findings of many earlier researches in terms of the nature and performance of REITs, these other researches found that the nature and financial performances of REITs differ in one investment market from another and these characteristics also changed over time. These changes could be driven by a host of different reasons such as disruptions in existing market structures or regulatory frameworks or even just due to the increasing sophistication of the investment market concerned (Sing & Ling, 2003). Therefore it is necessary to continue to monitor and validate the relevant theories and current research findings about the general REIT asset class, and in particular the S-REIT asset class, on a continuous basis.

The current research did compare the correlation of the S-REITs with other major asset classes such as equities, government bonds and publicly-listed companies, it did not dwell into the possible causes for such relationships. Understanding these underlying relationships would provide investors with greater insights into selecting and combining the different asset

classes with varying degrees of correlation so as to achieve well-diversified and structured portfolios with a minimum of volatility levels. It would also be useful to investors if subsequent researches could focus on quantifying the potential contributions of S-REITs in terms of risks and returns to multi-asset class investment portfolios.

This research has demonstrated the potential of newer asset allocation models to generate better-diversified and balanced asset allocations, the amount of research being carried in this area remains fairly limited, especially in the local investment scene. The existing research literature on many of these newer asset allocation models such as the CAPM and Black-Litterman are highly technical and mathematical in nature and therefore there is a need for future research to address the issue of adapting and developing these asset allocation models for ease of use by the general investors (Benninga, 2008).

Similarly, this current exploratory research demonstrated that statistical simulation techniques such as Michaud's re-sampling approach do appear to provide some degree of benefits in helping to generate stable and well-diversified portfolios in the face of limited available historical data sets to be used. However research into the validity and use of these techniques remains few and scattered and therefore there is a need to further research into the place and implementation of these statistical techniques in the area of strategic asset allocation for multi-asset class investment portfolios.

9.2 Limitations and Future Research Directions

In assessing the usefulness of the current research findings, it is also important to be mindful of several limitations faced by this exploratory research. First, the S-REIT asset class has only been made available to investors in the local investment market for less than six years. As such, there is a limited amount of available financial sample data to be used in the conduct this research. In researches carried out in other more mature REIT markets such as the US and Australia, financial data up to a period of more than eighty years have been used to generate robust theories and exhaustively test various hypotheses in their respective markets. Second, amongst the various S-REITs listed in the local stock exchange, there exists a number of cross-border REITs that earn at least part of their revenue streams by holding foreign real estate assets within their stable of real estate portfolios. Therefore, it is conceivable that the unit prices of these S-REITs with foreign real estate holdings will at least be partially affected by the underlying valuations of these foreign assets as well as the conditions and sentiments in these foreign property markets.

In view of the research findings and the associated discussions above, the following areas are suggestions for future research efforts. Since the research literatures revealed the tendency of the characteristics of asset classes, and in this case the S-REIT asset class, may evolve over time due to changing circumstances, it is then necessary to continue to verify and validate the findings and conclusions reached in this exploratory research as more financial data becomes available. Within the S-REIT asset class, there exist many different types of S-REITs of varying market capitalization and with different underlying real estate assets such as industrial or retail properties. It may thus be necessary to investigate the similarities and differences between these types of S-REITs and assess their suitability to be combined into a broad S-REIT asset class for subsequent incorporation into an investor's multi-asset class portfolio. The current research findings highlighted the differences in terms of the potential for diversification offered by the S-REIT asset class and publicly-listed property companies to different types of investors. There is therefore further scope to study the causes for these differences and research into ways by which investors can tap upon such differences to

maximize the benefit of exposing their portfolios to the real estate markets while minimizing the associated levels of volatility. Finally the current research also highlighted the need to appropriately test newer models of asset allocation, such as the CAPM and Black-Litterman models, and develop simpler mechanisms to adopt these sophisticated models for use by the different investors. The same can also be said of testing and implementing statistical simulation techniques as part of the overall strategic asset allocation approaches.

10. Conclusion

This exploratory research into the nature and characteristics of the S-REIT asset class revealed significant differences in terms of financial performances when compared against the other major asset classes. These differences allowed the S-REIT asset class to play a crucial role in achieving diversification and performance improvement benefits for the multi-asset investment portfolios. Newer and more sophisticated asset allocation models are available to provide the operational framework to guide investors into constructing such balanced and well-diversified multi-asset investment portfolios to achieve their target expected returns at acceptable levels of volatility. Given that it is still early days for the S-REITs in the local investment market, there exists significant potential for more in-depth and focused researches to be carried out in different aspects of this particularly interesting asset class.

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