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An Examination of Diversification Benefits under Different Market Conditions

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Abstract

This study examines risk diversification benefits achievable to the Australian mixed-asset portfolio of stocks and bonds from inclusion of listed property trusts (LPTs) as the third asset class in the portfolio. There is available considerable literature showing evidence of added risk diversification benefit from inclusion of property assets within the mixed-asset investment portfolio. This study extends knowledge in this area by examining whether the level of diversification benefit varies under different market conditions, that is, in a rising, static and falling market conditions. The three assets forming the portfolio: listed company shares, bonds and listed property trusts are represented by Australian share market index, bond index and listed property trust index respectively. Methods used for the analysis include rolling and recursive correlation and modern portfolio theory (MPT). Following MPT theory, several efficient frontiers are constructed to measure the different levels of diversification benefits under the three different market conditions. The study finds strong evidence to suggest that correlation of LPTs with stocks and bonds increase during the falling market conditions. Increasing correlation suggests that diversification strategies including LPTs should be reviewed under different market conditions. In particular during the falling market condition, the market volatility is highest and diversification of risk most required. However, the results of increasing correlation during this condition in fact suggest reduction in the diversification benefits. One of the important implications of this finding therefore is that investment strategies should carefully analyse the strategic levels of allocations to LPTs, in order to maximise diversification benefits when it is most needed during the falling market condition.

Keywords*: Stocks, Bonds, Listed property trust, Correlation, Volatility, Systematic, Unsystematic risk*

1. INTRODUCTION

Markowitz (1952), by formally developing the Modern Portfolio Theory (MPT), showed that investment portfolio risks could be reduced by diversifying the asset specific risks. Sharpe (1964) more formally differentiated between asset specific and market risks within the Capital Asset Pricing Model (CAPM). An asset's market risk is associated with the fluctuations (movements) of the general market that is systematic in nature and cannot be eliminated. This risk is usually measured by the beta coefficient, which measures the sensitivity of an asset's returns to the returns on some general market index (eg, S&P 500 or All Ordinaries Index for Australia).

An asset's specific risk is the residual of the market risk, which is unsystematic in nature, arising from the specific factors affecting an asset, which may not necessarily affect the general market. Therefore, in investment portfolios, by combining assets with alternate characteristics, the residual risk, which is usually measured by the alpha coefficient, can be reduced or diversified, leaving only the beta or systematic risk. The returns on assets with alternate characteristics that are lowly correlated are considered to be the best diversifiers of risk in investment portfolios. The level of correlation between assets is considered a key factor in determining portfolio diversification benefits.

There is considerable amount of literature which suggests that property investments, both direct (unlisted) and indirect (listed), have alternate risk and return characteristics to stocks

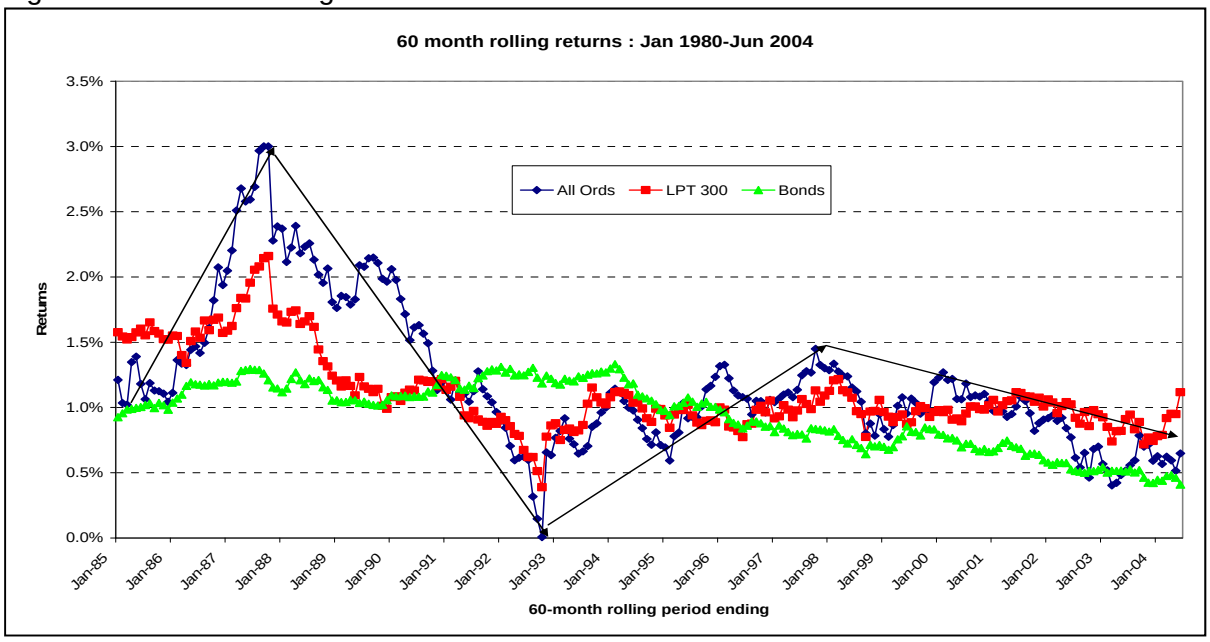
and bonds and by their addition to mixed-asset portfolios, could help reduce portfolio risks, providing diversification benefits. This study attempts to extend the knowledge in this area by examining whether the level of diversification benefit provided by Australian Listed Property Trusts (LPTs) to the mixed-asset investment portfolios of Australian stocks and bonds, varies under different market conditions.

Over the last two decades, the Listed Property Trust (LPT) market has gone through a substantial growth phase and the aggregate market capitalisation has reached about $60 billion, which constitutes about 8% of the total Australian stock market capitalisation (UBS Warburg, 2004). The growth of the sector can be attributed to a number of factors, for example, sector specific specialisation, increase in institutional ownership, changing management structure, changing capital structure, internationalisation and the increasing size of LPTs. These changes have led to the maturing of the sector which has seen a changing risk/return profile of LPTs over the years. For example, Newell and MacFarlane (1996) showed evidence of LPTs being highly correlated with stocks, whereas, Newell and Acheampong (2001) found evidence to suggest a substantial reduction in correlation between stocks and LPTs, and also LPT correlations with stock market varying between up and down market. Similar results were reported by Goldstein and Nelling (1998) and Liang (2002) for the U.S. real estate investment trusts (REITs).

This study examines the variation in diversification benefits under four market conditions: rising market, falling market, common rising market and common falling market. The overall study period is from January 1980 through June 2004, where January 1980 through September 1987 is categorised as the rising market, October 1987 through October 1992 as the falling market, November 1992 through October 1997 as the common rising market and November 1997 through June 2004 as the common falling market. Respectively, 33, 61, 60 and 80 monthly return observations are analysed for each market condition, adding to 236 monthly observations over a 20-year period from Januray 1980 through June 2004. See Figure 1.

2. ANALYSIS AND RESULTS

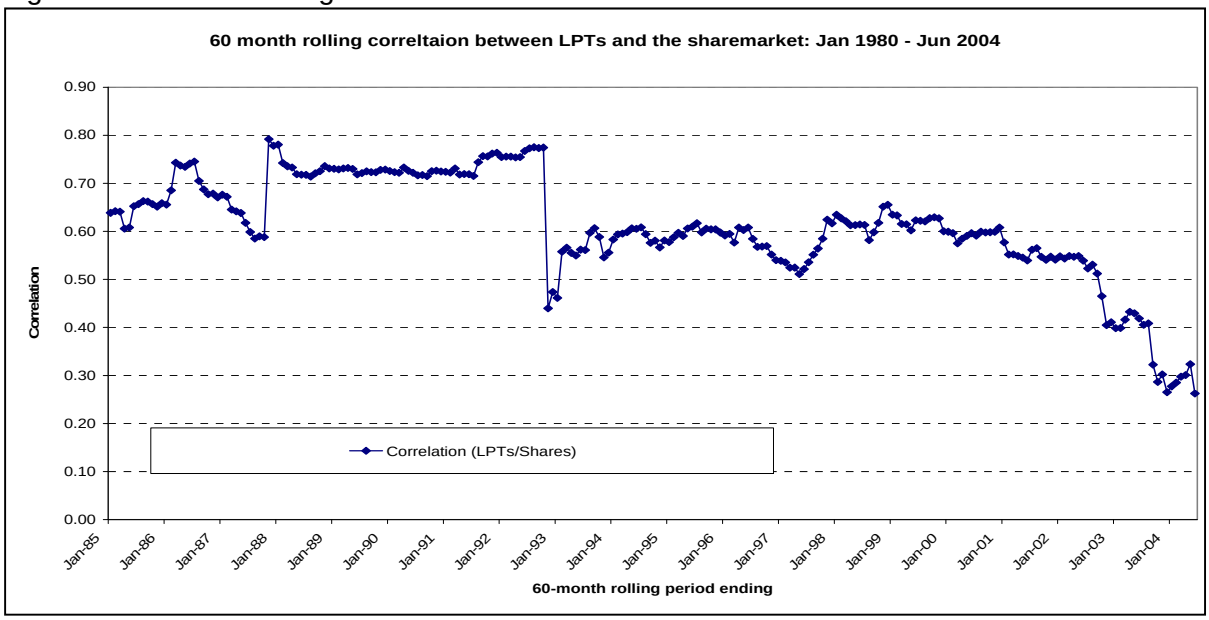
Figure 1: 60 month rolling returns



In order to assess the variation in diversification benefits over the four different market conditions, the following analyses are performed:

a. 60 month rolling correlations between LPTs and the sharemarket are calculated to assess the variation in correlations between LPTs and the sharemarket over the four different market conditions,
b. The variations in correlation between the correlation of LPTs with shares and bonds are compared with the risk of LPTs, shares and bonds over the four different market conditions,
c. Rolling correlation between LPTs, shares and bonds are compared with the alpha and beta risks,
d. Efficient frontiers are constructed to assess the variation in the level of diversification benefits over the four different market conditions and finally,
e. The efficient frontiers are ranked by the Sharpe ratios and z-statistics calculated for measuring the cross-sectional difference in the means of the Sharpe ratios. In this way, whether the variations in the level of the diversification benefits over the four different market conditions are significant, is assessed.

Figure 2: 60 month rolling correlation between LPTs and the share market



As shown in Figure 2, the correlations reach the highest levels during the falling market (r=.80) between October 1987 and October 1992. The correlations start falling over the common rising market condition between November 1997 and June 2004, reaching its lowest level in June 2004. These findings of increasing and decreasing of the correlations between LPTs and shares are consistent with the similar findings by Newell et al (2001) and Goldstein and Nelling (1999) for REITs.

In Figures 3 and 4, correlations between LPTs and shares and LPTs and bonds are compared with risk of LPTs and shares and risks of LPTs and bonds, respectively. As shown in Figure 2, correlation between LPTs and shares is positively correlated with both LPT risk (r=81) and share risk (r=80). The correlation is highest during the falling market when the volatility of both LPT and share market are highest. These findings suggest a reduction in portfolio diversification benefits when these benefits are most needed in a mixed-asset portfolio context. These are consistent with the previous findings by Newel et al (2001). The correlation between LPTs and bonds with bond volatility is high as well (r=76) during the falling market between October 1987 and October 1992.

Figure 3: Rolling correlation versus total rolling risk: LPTs and shares

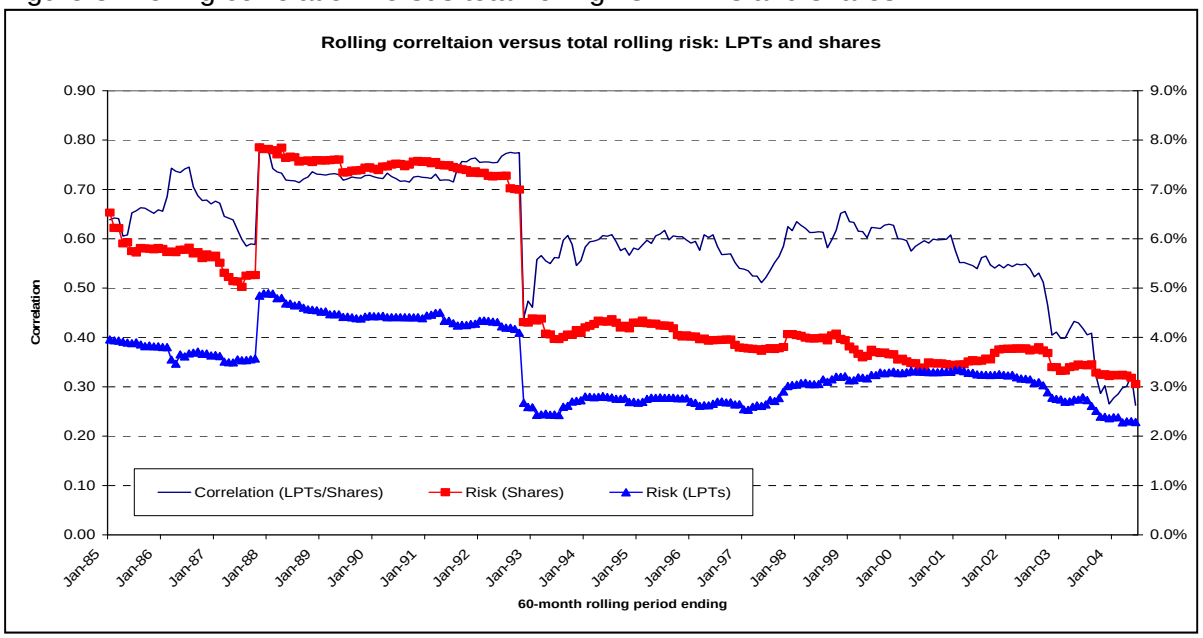
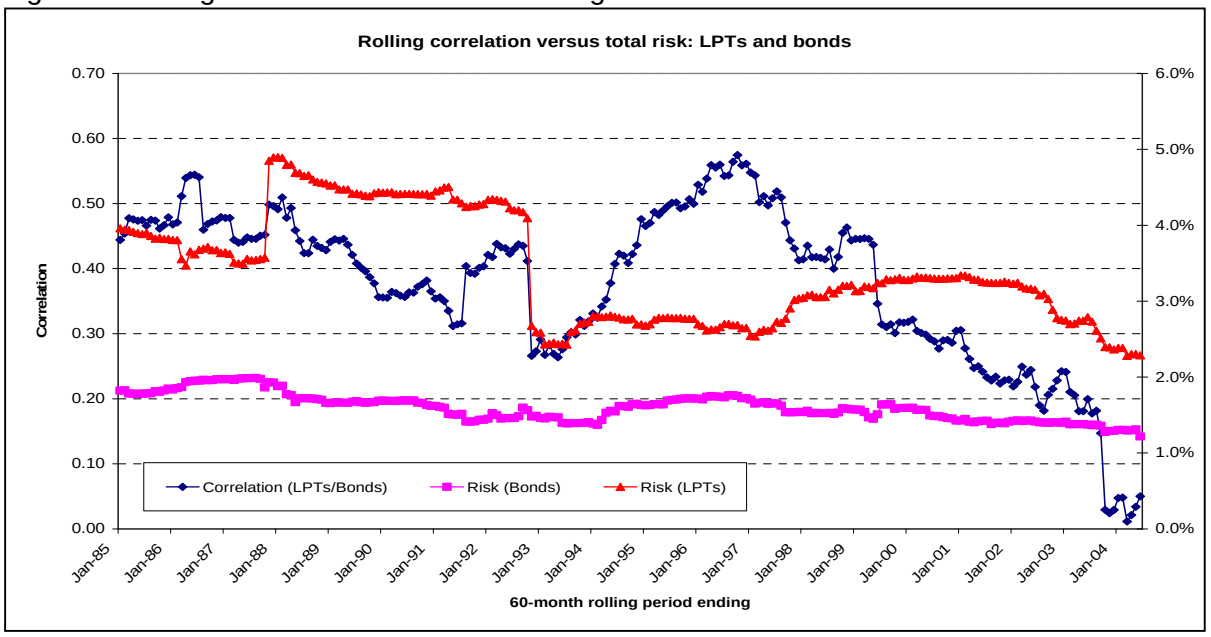


Figure 4: Rolling correlation versus total rolling risk: LPTs and bonds



In Figures 5 and 6, correlations between LPTs and shares and LPTs and bonds are compared with alpha and betas risks of LPTs over the four different market conditions, respectively. As shown in Figure 5, the correlation between LPTs and shares is positively correlated with the beta risk (r=57), with the correlations increasing during the falling and common falling market conditions, similar to the correlation between LPTs and shares with the total LPT volatility. The correlation between LPTs and bond volatility is higher (r=77). Interestingly, the correlation between LPTs and shares is negatively correlated (r=-19) with the LPT and share alpha risk and (r=-37) with LPT and bond alpha risk. Also, these correlations decrease during the falling and common falling market. However, because the alpha risk of LPTs are not significant, these reductions in correlation not necessarily provide significant increased level of diversification benefits during the falling markets.

Figure 5: Rolling correlation versus beta and alpha risk: LPTs and shares

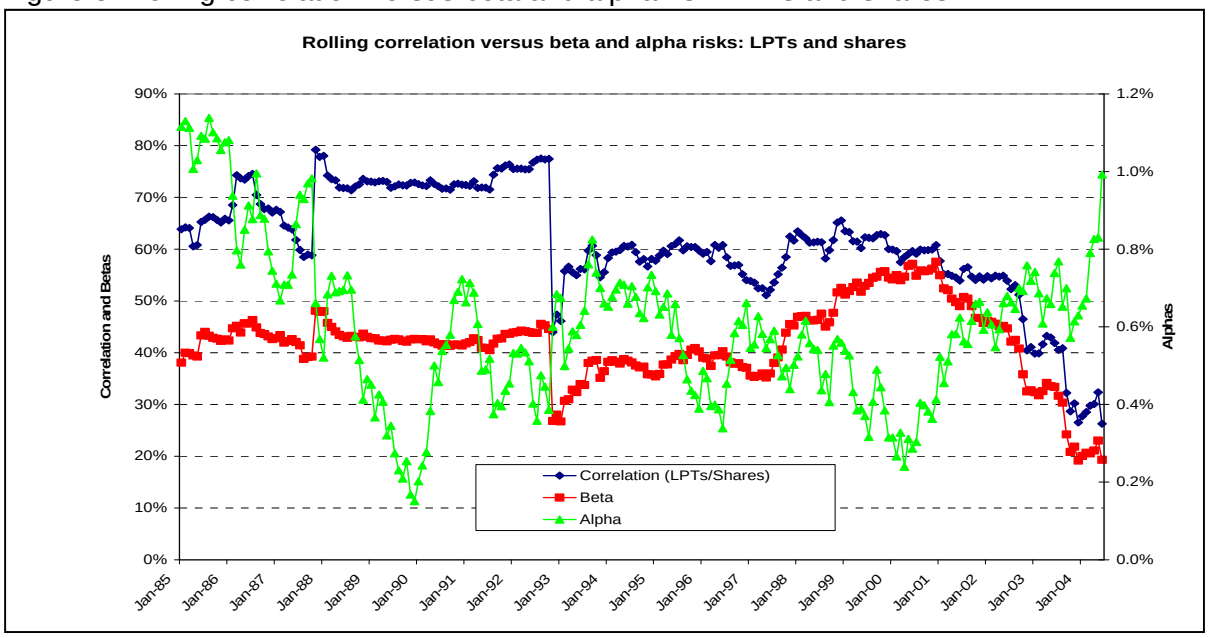
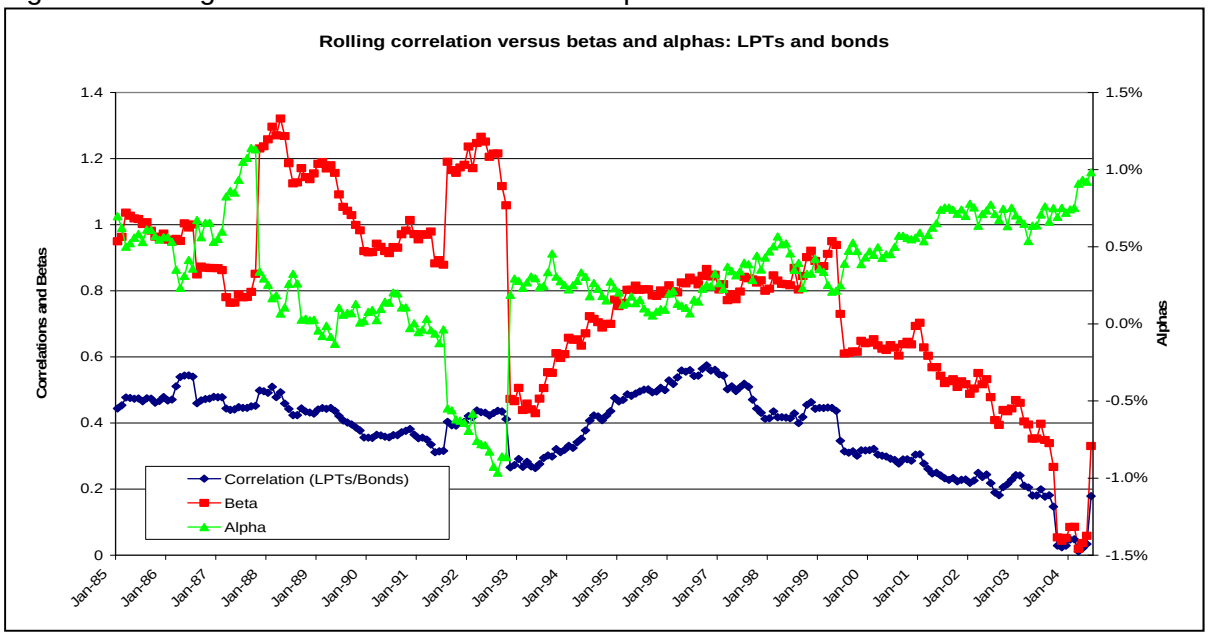


Figure 6: Rolling correlation versus betas and alphas: LPTs and bonds



In Figure 7, efficient frontiers of the mixed-asset portfolios of LPTs, shares and bonds, over the four different market conditions, are compared. The portfolios are efficient in the MPT context with asset allocation to LPTs and bonds constrained to 20%. These constraints are applied to reflect a more practical asset allocation within the mixed-asset context. The examination of the efficient frontiers suggest that the diversification benefit from including LPTs in mixed-asset portfolios increases during the rising market conditions and reduces during the falling market conditions when it is most needed. The Sharpe ratios and z-statistics in Figure 8, suggest that diversification benefits from including LPTs in the mixed-asset portfolios are not significant during both falling market and common falling market conditions. The findings are consistent with the previous finding by Newell et al (2001) for LPTs and Goldstein and Nelling (1999) for REITs based on assessment of asset correlations.

Figure 7: Efficient frontiers for portfolios over four different market conditions

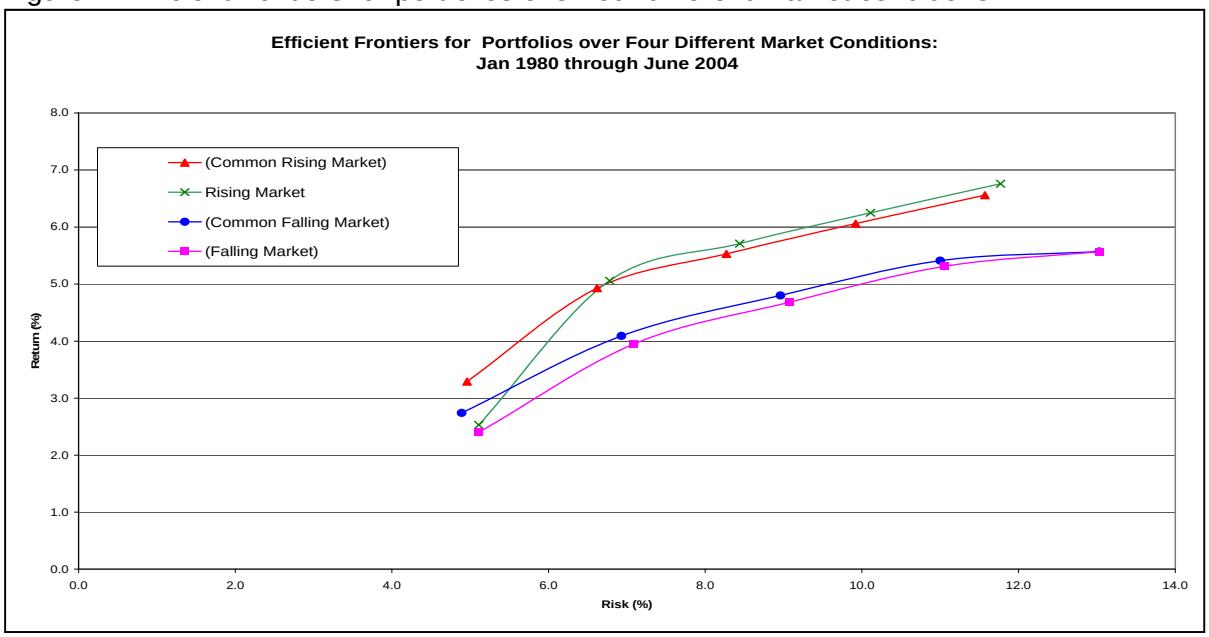


Figure 8: Sharpe ratios and statistical significance between mixed-asset portfolios over four different market conditions

Sharpe Ratios and Statistical Significance between Mixed-Asset Portfolios over Four Different Market Conditions: Jan 1980 through June 2004

	Sharpe Ratios			
No of Portfolios	(SB/LPT-20%) Rising Market	(SB/LPT-20%) Falling Market	(SB/LPT-20%) Common Rising Mkt	(SB/LPT-20%) Common Falling Mkt
1	0.6633	0.4951	0.5603	0.4697
2	0.7447	0.7463	0.5902	0.5571
3	0.6687	0.6765	0.5357	0.5160
4	0.6109	0.6182	0.4918	0.4805
5	0.5670	0.5743	0.4275	0.4275
Mean	0.6509	0.6221	0.5211	0.4902
Variance	0.0045	0.0092	0.0040	0.0024

Z-Statistics for the difference in Sharpe Ratios of the Efficient Frontiers				
	(SB/LPT-20%) Rising Market	(SB/LPT-20%) Falling Market	(SB/LPT-20%) Common Rising Mkt	(SB/LPT-20%) Common Falling Mkt
Mean	0.6509	0.6221	0.5211	0.4902
Known Variance	0.0045	0.0092	0.0040	0.0024
Hypothesized Mean Difference	0.0000	0.0000	0.0000	0.0000
z-Statistics	**5.466****	**3.452****	**1.764 ns**	**0.980 ns**

*: $p < 5\%$; **: $p < 1\%$; ns = not significant.

3. CONCLUSION

In this study strong evidence is found to suggest that the correlation of LPTs with stocks and bonds increase during the falling market conditions. This finding of increasing correlation of LPTs with shares and bonds, suggest that diversification strategies including LPTs should be frequently reviewed. Therefore, it is essential to assess the level of diversification benefits including LPTs in portfolios, over different stages of the investment cycles; in particular, during the period of increasing market volatility (i.e. during the falling market conditions). The results indicate that correlations between LPTs, shares and bonds increase during the period of increasing market volatility, reducing diversification gains when they are most needed. This is considered to be an important finding. The findings correspond with similar results found by (Newell and Acheampong, 2001) for different time periods. Most importantly, the findings of this study suggest that investment strategies should carefully analyse the strategic levels of allocations to LPTs, in order to maximise diversification benefits. A careful analysis of allocations made to LPTs is required particularly during the period of increasing market volatility, during which correlations between LPTs, shares and bonds are shown to increase and diversification benefits reducing.

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