

THE DYNAMICS OF THE AUSTRALIAN PROPERTY TRUST MARKET RISK AND CORRELATION PROFILE

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ABSTRACT

The diversification benefits of listed property trusts (LPTs) in investment portfolios in Australia are assessed under different market conditions over 1980–2000. Correlations between LPTs and shares are shown to vary considerably, with the correlation increasing significantly in down-market conditions. This increased correlation between LPTs and shares is also linked to increased LPT and stockmarket volatility. This highlights the need to consider market conditions when considering asset allocations and the level of LPTs in investment portfolios. Given the considerable growth and maturity in LPTs since 1990, LPTs were also seen to retain their portfolio diversification benefits with increased stockmarket volatility in the 1990's, compared to the potential loss of some of these portfolio diversification benefits in the 1980's.

Keywords: Property trusts, semi-correlation, asset risk, inter-asset correlation, portfolio diversification benefits.

INTRODUCTION

Listed property trusts (LPTs) have been a successful indirect property investment vehicle in Australia (Property Investment Research, 2000). At September 2001, the LPT sector accounted for over \$40 billion in market capitalisation, representing over 5% of total Australian stockmarket capitalisation (UBS Warburg, 2001).

While the relationship between U.S. real estate investments trusts (REITs) and the U.S. stockmarket has attracted considerable attention by property academics (eg: Eichholtz and Hartzell, 1996; Goldstein and Nelling, 1999; Mueller et al, 1994; Myer and Webb, 1993, 1994; Okunev and Wilson, 1997; Terris and Myer, 1995; Wilson and Okunev, 1996, 1999; Wilson et al, 1998), the equivalent relationship between property trusts and the Australian stockmarket (ASX) has only received limited attention by property academics (Newell and MacFarlane, 1996; Okunev and Wilson, 1997; Wilson and Okunev, 1996, 1999; Wilson et al, 1998). Given the significance of LPTs in Australia, further research into the dynamic relationship between LPTs and the stockmarket is needed.

In particular, while LPT and stockmarket performance in Australia are correlated ($r = .67$ over 1985–2000) (Property Council of Australia, 2001), it has been shown that there is no long-term market integration between LPTs and the stockmarket (Wilson and Okunev, 1996, 1999; Wilson et al, 1998). This evidence of market segmentation

suggests that there are diversification benefits from including LPTs in an investment portfolio.

Inter-asset correlations change over time and are linked to economic activity, property cycles and business cycles (Erb et al, 1994; Kaplanis, 1988; Longin and Solnik, 1995; Solnik et al, 1996). Whilst the usual measure of inter-asset correlation represents the average co-movement over a specified time period, knowing how assets co-move in different market phases or market conditions is important for portfolio management, asset allocation weightings and understanding future inter-asset correlation dynamics.

Separate inter-asset correlations in different market conditions (eg: rising or declining stockmarkets) enable the detection of whether correlations change in these market environments. For example, international share correlations increase in periods of high market volatility (Solnik et al, 1996) and international share correlations are higher in recessions than during growth periods (Erb et al, 1994). For REITs, the REIT/stockmarket correlation varied considerably in rising or declining stockmarkets over 1972–98 (Goldstein and Nelling, 1998). This REIT/stockmarket correlation in a declining market ($r = .64$) was nearly double that seen in a rising market ($r = .35$), and compared to a correlation of $r = .60$ over the full period of 1972–98.

Similarly, with the growth of REITS since 1993 in the “new REITs era”, the correlation between REITs and the U.S. stockmarket has changed significantly (Liang, 2000). This has seen correlations of .50–.80 in the 1980’s decline steadily throughout the 1990’s to levels of .20–.30 (Liang, 2000), with the correlation between REITs and the stockmarket at December 2000 declining to nearly zero (McAllister and Liang, 2001). These recent low correlations indicate that REITs offer substantial diversification benefits.

As such, market conditions and changing market dynamics need to be carefully assessed to obtain a clearer perspective on portfolio diversification issues (Goldstein and Nelling, 1998). In particular, linked with increased market volatility, increased inter-asset correlations will result in reduced portfolio diversification benefits in an investment environment when overall portfolio risk reduction and diversification benefits are most needed in a mixed-asset portfolio context (Solnik et al, 1996).

Given these portfolio diversification issues from studies involving international shares and REITs, it is important to assess whether equivalent diversification trends are evident for LPTs in Australia; particularly as LPTs are typically perceived as defensive stocks and have also experienced significant growth in market capitalisation from \$5 billion to over \$35 billion in the last ten years (Blundell, 2001).

As such, the purpose of this research is to examine the changing correlation and asset risk profiles under different investment cycle conditions. In particular, the issues of whether the inter-asset correlations involving LPTs change under different market conditions and whether the inter-asset correlations involving LPTs increase with increasing market volatility will be assessed. Similarly, given the significant growth of LPTs in the 1990’s, differences in the dynamics of these relationships in the 1990’s will be compared to the 1980’s.

METHODOLOGY

Data sources

For property trusts, the monthly LPT total return series (UBS Warburg, 2001) was used over January 1980–June 2000. For comparative performance analysis and mixed-asset portfolio diversification considerations, the following total return series were also used:

- shares: ASX All Ordinaries index series
- bonds: UBS Warburg government bond index series.

Statistical procedures

Rather than correlation, semi-correlation more effectively differentiates between asset co-movements in different or segmented market conditions. Semi-correlation is conditional on realised returns, with ex-post returns segmented into below average (-) and above average (+) performance. This results in semi-correlations for three scenarios for the various asset pairs:

- common up-markets: $r(+ +)$
- common down-markets: $r(- -)$
- out-of-phase mixed markets: $r(+ -)$ and $r(- +)$ (combined).

Whilst alternative definitions of advancing and declining markets are available (eg: Goldstein and Nelling, 1999), this definition is consistent with that utilised by Solnik et al (1996) in considering equivalent issues relating to international shares.

To examine the dynamics of asset risk and inter-asset correlations, rolling correlations and rolling risks were calculated using rolling 5-year performance periods over 1980–2000. Rolling 5-year performance periods were selected to ensure stability in the analysis. Analyses were also conducted over 1980–90 and 1991–2000 to examine the dynamics in the more recent period of significant growth for LPTs.

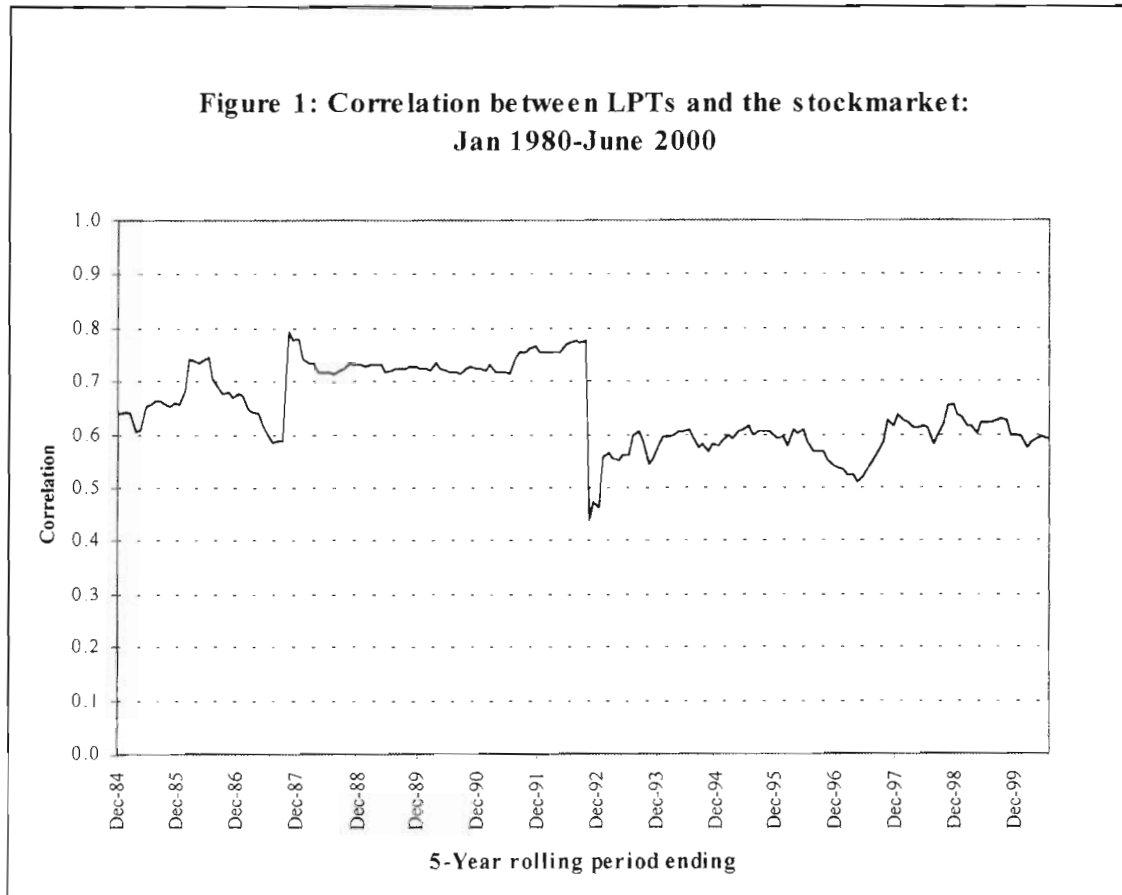
Analyses were conducted using macros in Excel, rather than using specific econometrics software.

CORRELATION AND SEMI-CORRELATION ANALYSIS

Correlation analysis

Figure 1 presents the rolling 5-year correlations between LPTs and the stockmarket over 1980–2000. While the correlation varied between .45 and .78 over this twenty-year period, recent years have seen correlations of approximately .60. Over the full 20-year period, the correlation between LPTs and the stockmarket was .64. The “spikes” in Figure 1 at October 1987 and October 1992 are a direct consequence of the inclusion of the October 1987 stockmarket crash and its subsequent omission (post-September 1992) from the use of 5-year rolling correlations.

While these correlations have not declined to the same extent as for REITs in recent years (Liang, 2000), they do indicate a lesser correlation between LPTs and the stockmarket since 1992, which is the period that coincides with significant LPT growth. This issue of changing investment dynamics and LPT growth will be considered in a subsequent section of this paper.



Semi-correlation analysis

Table 1 presents the semi-correlation analysis for LPTs, shares and bonds over January 1980–June 2000 under the conditions of common up-markets (+ +), common down-markets (- -) and out-of-phase mixed-markets (+ - and - +). For LPTs and shares, the common up-market correlation ($r = .18$) and common down-market correlation ($r = .80$) differed substantially from the overall correlation ($r = .64$) between LPTs and shares. The common down-market correlation ($r = .80$) was significantly above that of the common up-market correlation ($r = .18$), with this trend of increasing correlations from up-market to down-market conditions consistent with that seen for U.S. REIT/stockmarket correlations (Goldstein and Nelling, 1999) and international stockmarket correlations (Erb et al, 1994). For LPTs and bonds, no differences were evident in the common up-market correlation ($r = .19$) and common down-market correlation ($r = .21$).

Table 1: Semi-correlation analysis: January 1980–June 2000

Semi-correlation category	LPTs and Shares		LPTs and Bonds	
	r	Percentage of sample	r	Percentage of sample
Common up-market (++)	.18	36% (n = 89)	.19	31% (n = 77)
Common down-market (--)	.80	37% (n = 92)	.21	31% (n = 76)
Out-of-phase mixed-market	-.63	27% (n = 65)	-.55	38% (n = 92)

This semi-correlation analysis clearly identifies the significant differences in correlations involving LPTs with shares under these different market conditions. With inter-asset correlations being key inputs into asset allocation models, it also highlights that the use of ex-post historic correlations involving LPTs are not necessarily the most appropriate correlations under all market conditions. It is important to recognise that different correlations are needed under different future market conditions and this will result in more appropriate estimates of ex-ante correlations for use in these asset allocation models. This is particularly true for the inter-asset correlations involving LPTs and shares, as shown in Table 1.

Asset allocation scenario analysis

To examine this investment issue, asset allocations are considered under four scenarios:

- scenario # 1: use of total correlations
- scenario # 2: use of common up-market correlations
- scenario # 3: use of common down-market correlations
- scenario # 4: use of out-of-phase mixed-market correlations.

Inter-asset correlations for these four scenarios are as per Table 1. The respective annual asset risks and returns over 1980–2000 are given as:

- shares: average annual return = 16.61%
annual risk = 19.45%
- bonds: average annual return = 11.94%
annual risk = 5.76%
- LPTs: average annual return = 14.70%
annual risk = 12.54%,

with the resulting asset allocations under these four scenarios shown in Table 2.

Table 2: Impact of inter-asset correlation scenarios on asset allocation: 1980–2000

ASSET ALLOCATIONS						
Portfolio risk (%)	Scenario #1			Scenario #2		
	LPTs (%)	Shares (%)	Bonds (%)	LPTs (%)	Shares (%)	Bonds (%)
5.74	4	0	96	4	0	96
7.11	26	10	64	28	15	57
8.48	34	17	48	40	23	37
9.86	42	23	35	50	30	20
11.23	48	29	22	59	36	5
12.60	55	35	10	49	51	0
13.97	58	42	0	36	64	0
15.34	40	60	0	26	74	0
16.71	26	74	0	17	83	0
18.08	12	88	0	8	92	0
19.45	0	100	0	0	100	0

Portfolio risk (%)	Scenario #3			Scenario #4		
	LPTs (%)	Shares (%)	Bonds (%)	LPTs (%)	Shares (%)	Bonds (%)
5.74	4	0	96	8	3	90
7.11	28	8	64	53	47	0
8.48	35	15	50	44	56	0
9.86	41	21	38	38	62	0
11.23	46	27	26	32	68	0
12.60	52	33	15	26	74	0
13.97	57	38	5	21	79	0
15.34	48	52	0	15	85	0
16.71	31	69	0	10	90	0
18.08	15	85	0	5	95	0
19.45	0	100	0	0	100	0

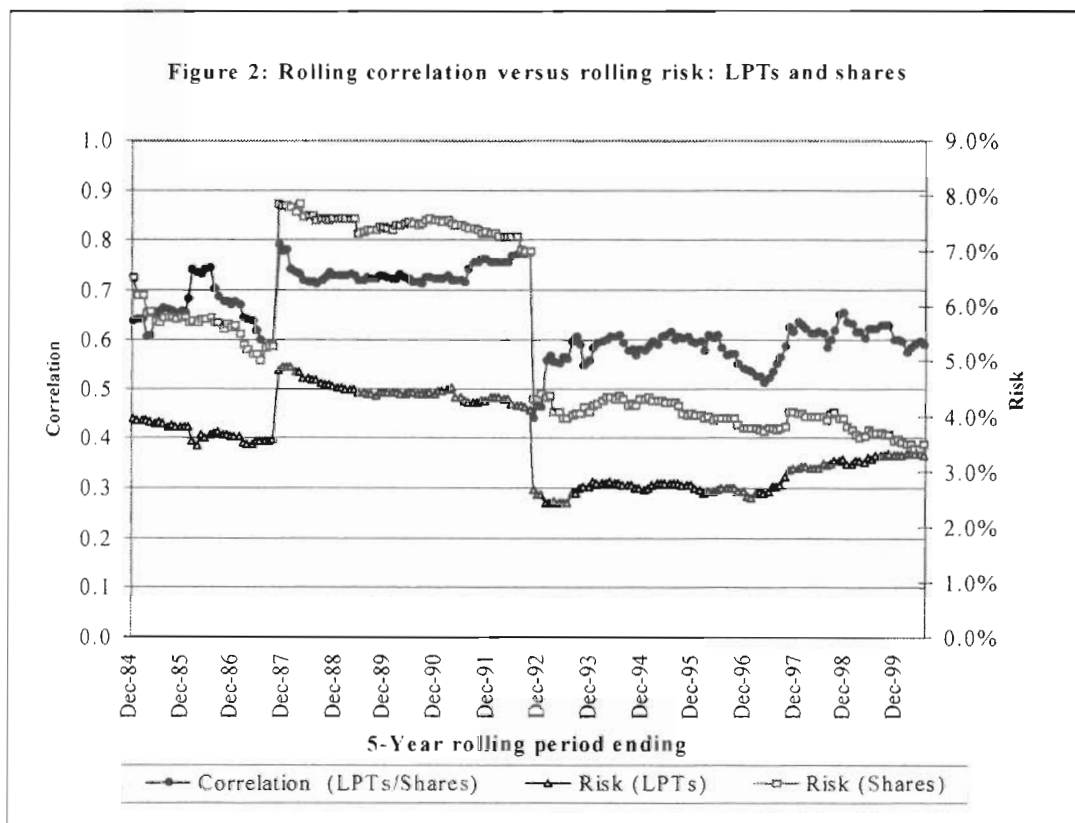
Under these four inter-asset correlation scenarios, the asset allocations vary considerably over the mixed-asset portfolio risk spectrums. In particular, the common up-market situation (scenario #2) resulted in higher levels of LPTs in the mixed-asset portfolio compared to the standard “total” situation (scenario #1). The common down-market situation (scenario #3) resulted in comparable levels of LPTs in the mixed-asset portfolio.

As expected, the mixed-market situation (scenario #4) resulted in LPTs figuring prominently at lower risk levels (<10%), but at significantly reduced levels at the higher mixed-asset portfolio risk levels (>10%). These asset allocations provide further evidence of the need to recognise the different inter-asset correlations in different phases of market conditions and, in particular, those correlations involving LPTs.

Given these asset allocation scenario results, and with down-market conditions tending to be more volatile than up-market conditions (Solnik et al, 1996), these increased correlations for LPTs with shares reflect a potential general reduction in portfolio risk reduction and portfolio diversification benefits from LPTs under these conditions of increased market volatility. The next step is to examine more closely the relationship between the correlation and volatility for shares, bonds and LPTs over this 20-year period.

LINKING LPT CORRELATIONS AND ASSET VOLATILITY

Using 5-year rolling correlations and risks, Figures 2 and 3 present the relationship between the correlation and risk for LPTs and shares (Figure 2), and LPTs and bonds (Figure 3) over 1980–2000. From Figures 2 and 3, the following investment trends are evident:

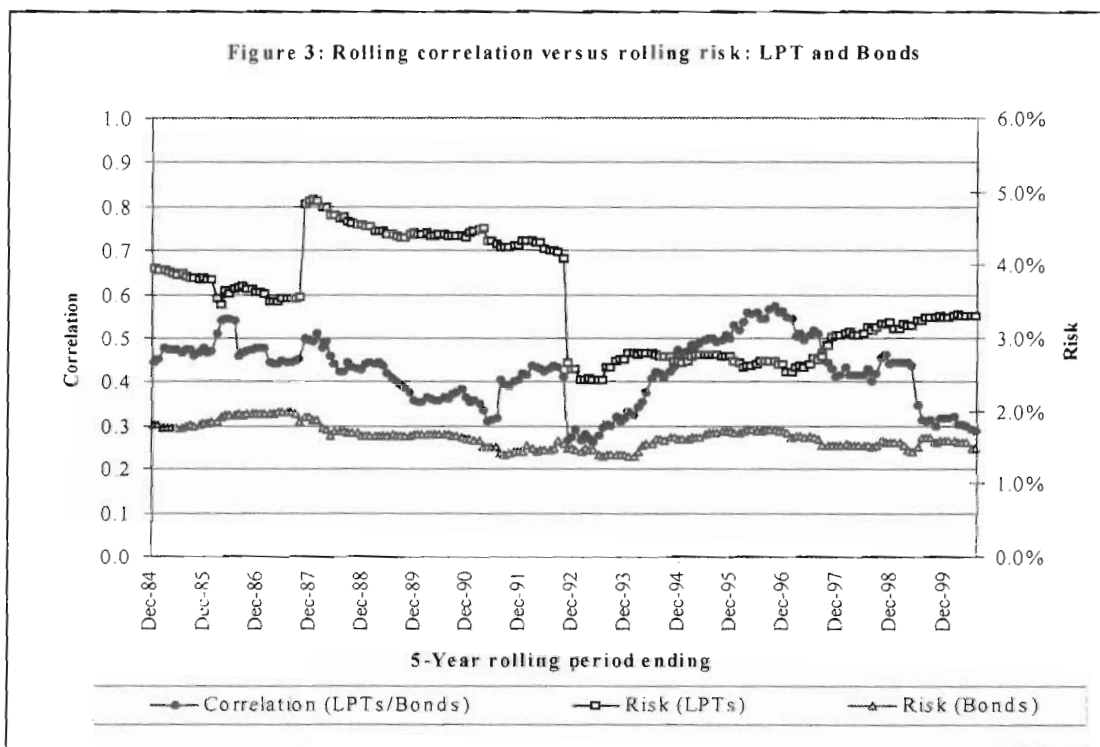


LPTs and shares

Figure 2 shows that the correlation between LPTs and shares is positively associated with LPT volatility ($r = .89$) and share volatility ($r = .88$). This increased correlation between LPTs and shares during periods of increasing LPT volatility and increasing stockmarket volatility will result in reduced portfolio diversification benefits when these benefits are most needed in a mixed-asset portfolio context.

LPTs and bonds

Figure 3 shows that the correlation between LPTs and bonds is not associated with LPT volatility ($r = -.05$) and bond volatility ($r = .01$). This lack of correlation during periods of increasing LPT volatility and bond volatility reinforces the diversification benefits of LPTs with bonds.



CHANGING INVESTMENT DYNAMICS AND LPT GROWTH

While operating since the 1980's, prior to the early 1990's, the LPT sector was small and was dominated by a few property trusts (for example, General Property Trust, Westfield, Schroders, Stockland). Since the 1990's, the LPT sector has undergone major structural changes, including a significant increase in the number of LPTs and their associated market capitalisation. This has seen the LPT market capitalisation increase from \$5 billion to over \$35 billion in the last ten years (Blundell, 2001) Other important factors over this period have been substantially increased LPT gearing levels (Property Investment Research, 2000) and LPTs taking on more of the investment performance features of direct property (Newell, 2001). Given these LPT changes in the 1990's, it is important to assess whether these dynamics have changed over 1980–2000, by comparing the dynamics of these relationships in the 1990's with those seen in the 1980's.

Table 3: Semi-correlation: sub-period analysis

Panel A: LPTs and Shares						
Semi-correlation category	1980–90		1991–2000		1980–2000	
	r	Sample size	r	Sample size	r	Sample size
Common up-market (++)	.22	38%	.14	33%	.18	36%
Common down-market (--)	.91	35%	.45	36%	.80	37%
Out-of-phase mixed-market	-.63	27%	-.64	31%	-.63	27%
Total	.67	100%	.59	100%	.64	100%

Panel B: LPTs and Bonds						
Semi-correlation category	1980–90		1991–2000		1980–2000	
	r	Sample size	r	Sample size	r	Sample size
Common up-market (++)	.34	31%	.17	32%	.19	31%
Common down-market (--)	.47	30%	-.07	32%	.21	31%
Out-of-phase mixed-market	-.40	39%	-.58	36%	-.55	38%
Total	.39	100%	.41	100%	.39	100%

Table 3 (panel A) presents the correlation between LPTs and the stockmarket over 1980–90 and 1991–2000. These correlations for 1980–90 ($r = .67$) and 1991–2000 ($r = .59$) only declined marginally over these sub-periods. Similarly, Table 3 (panel B) shows the corresponding correlations for LPTs and bonds, with no difference in the correlations for 1980–90 ($r = .39$) and 1991–2000 ($r = .41$).

The sub-period semi-correlation analysis for LPTs, shares and bonds over 1980–90 and 1991–2000 is shown in Table 3. For LPTs and shares (see panel A), the common down-market correlations were significantly above the common up-market correlations in both sub-periods. However, the magnitude and extent of the differences between these common up-market and common down-market correlations were less evident in the period of 1991–2000, reflecting more maturity and depth in the LPT market in the last ten years, and subsequently resulting in more stability in the asset allocation scenarios for 1991–2000 compared to the earlier ten year period of 1980–90. For LPTs and bonds (see panel B), more stability was seen in the common up-market and common down-market correlations in both sub-periods.

To assess sub-period differences in whether the inter-asset correlations involving LPTs increase with increasing market volatility, analyses were carried out for 1980–90 and 1991–2000. While over the full period of 1980–2000, the correlation between LPTs and shares was positively associated with LPT volatility ($r = .89$) and share volatility ($r = .88$), the equivalent sub-period correlation results were:

- 1980–1990: $r = .71$ and $r = .77$ respectively
- 1991–2000: $r = .69$ and $r = .17$ respectively.

These sub-period results clearly indicate that increased correlations between LPTs and shares occurred during periods of increasing stockmarket volatility over 1980–90, resulting in reduced portfolio diversification benefits for LPTs when these benefits were most needed over 1980–90. Importantly, as the LPT market increased in maturity and depth over 1991–2000, the correlation between LPTs and shares did not increase during periods of increasing stockmarket volatility. This clearly indicates that LPTs retained their portfolio diversification benefits over 1991–2000, even in periods of increasing stockmarket volatility.

Similarly for LPTs and bonds over 1980–2000, the correlation between LPTs and bonds was not associated with LPT volatility ($r = -.05$) and bond volatility ($r = .01$). The equivalent sub-period correlation results were:

- 1980–1990: $r = -.40$ and $r = .69$ respectively
- 1991–2000: $r = -.91$ and $r = .66$ respectively.

These sub-period results clearly indicate LPTs retained their portfolio diversification benefits during periods of increasing LPT volatility, although these portfolio diversification benefits were reduced to some extent during periods of increasing bond volatility.

PROPERTY INVESTMENT IMPLICATIONS

While the asset allocation process is most sensitive to expected asset returns, differences in inter-asset correlations and asset risks will influence optimal portfolio weights. With inter-asset correlations and asset risks varying at different stages of the LPT and stockmarket cycles, it is essential to assess whether portfolio diversification benefits are reduced at various stages in these investment cycles. In particular, it is important to assess whether the correlation of LPTs with the other asset classes increases in periods of increasing market volatility. Using the LPT performance data over 1980–2000, it can be seen that the correlation of LPTs with shares increased in periods of increased stockmarket volatility, although importantly, this was not the case for LPTs and shares in the last ten years as the LPT market matured to its current significant level.

These findings raise a number of key LPT investment issues regarding asset allocation dynamics and the role of LPTs in mixed-asset portfolios. Firstly, as asset allocation is a forward-looking process to accommodate and take advantage of future asset market movements, it is a naive investment strategy to simply use the historic ex-post inter-asset correlations in asset allocation models. Failure to accommodate the future market conditions of LPT and stockmarket cycles in developing ex-ante inter-asset correlations will result in inefficient asset allocations; particularly given the

significant changes in the inter-asset correlations under different market conditions as demonstrated in this study.

Secondly, the significance of the portfolio diversification benefits of LPTs in a mixed-asset portfolio have been confirmed, particularly in the last ten years as the LPT market has matured; specifically, the continued diversification benefits of LPTs in more recent years in an environment of increasing stockmarket volatility, which is when these benefits are most needed in a mixed-asset portfolio context.

These results complement the findings of Wilson and Okunev (1996, 1999) and Wilson et al (1998), where evidence of market segmentation between LPTs and shares supported that diversification benefits existed from including LPTs in an investment portfolio. In particular, this research supports the extent of this diversification benefit in more recent years has been enhanced in an environment of increasing stockmarket volatility, which is the environment when LPT diversification benefits are most needed in a mixed-asset portfolio context.

This issue has become more important recently, as the ongoing effect of LPT merger and acquisition activity is factored into LPT pricing and performance, with the LPT universe decreasing from 50 LPTs to 35 LPTs over 1999–2001 (Blundell, 2001; UBS Warburg, 2001). The effect of factors such as the dot.com downturn and increased international stockmarket instability following the events of September 11 have also contributed to increased stockmarket volatility. Careful consideration of the issues raised in this research will give a fuller understanding of the resulting implications for asset allocation, portfolio diversification and the strategic level of LPTs in Australian investment portfolios. In particular, this research has highlighted the continued strong portfolio diversification benefits of LPTs in more recent years.

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