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THE DYNAMICS OF PROPERTY TRUST RISK AND CORRELATION

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INTRODUCTION

Listed property trust (LPTs) have been the most successful indirect property investment vehicle in Australia. Surveys conducted by the Australian Stock Exchange in 1999 found that the LPT sector was the fastest growing stockmarket sector, increasing its number of investors by 88%, compared to the overall stockmarket increase in investors of 21%. At June 2000, the LPT sector accounted for over $33.5 billion in market capitalisation, representing 5.2% of total stockmarket capitalisation.

While the relationship between REITs and the U.S. stockmarket has attracted considerable attention (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 (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 relationship between LPTs and the stockmarket is needed.

In particular, inter-asset correlations change over time (Erb et al, 1994; Kaplanis, 1988; Longin and Solnik, 1995; Solnik et al, 1996) and are linked to economic activity, property cycles and business cycles. 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 markets) 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.

As such, market conditions 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

in LPTs. As such, the purpose of this research is to utilise the ASX LPT index, and associated stockmarket and bonds performance indices over 1980-2000 to examine changing correlation and asset risk profiles under different investment cycle conditions.

In particular, two important hypotheses will be examined:

(1) do the inter-asset correlations involving LPTs change under different market conditions
(2) do the inter-asset correlations involving LPTs increase with increasing market volatility,

with the resulting LPT investment implications critically assessed.

METHODOLOGY

Data sources

For property trusts, the monthly LPT total return series (UBS Warburg, 2000) 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, semicorrelation more effectively differentiates between asset co-movements in different or segmented market conditions. Semicorrelation is conditional on realised returns, with ex-post returns segmented into below average (-) and above average (+) performance. This results in semicorrelations 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.

CORRELATION AND SEMI-CORRELATION ANALYSIS

Figure 1 presents the rolling 5-year correlations between LPTs and the stockmarket over 1980-2000. While the correlation varied between 0.45 and 0.78 over this twenty-year period, recent years have seen correlations of approximately 0.60. Over the full 20-year period, the correlation between LPTs and the stockmarket was 0.63.

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 = .63) 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.A. REIT/stockmarket correlations (Goldstein and Nelling, 1998) 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).

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 the standard 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.

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.

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, Figure 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 stockmarket volatility will result in reduced portfolio diversification benefits when these benefits are most needed.

* 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.

PROPERTY 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 stock market volatility, although this was not the case for LPTs and bonds.

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 questioned; particularly the continued diversification benefits of LPTs in an environment of increasing stockmarket volatility.

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

Semi-correlation category	LPTs/Shares r	LPTs/Shares Percentage of sample	LPTs/Bonds r	LPTs/Bonds Percentage of sample
Common up-market (++)	.18	36%	.19	31%
Common down-market (--)	.80	37%	.21	31%
Out-of-phase mixed-market	-.63	26%	-.55	37%
Total	.64	100%	.39	100%

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

	ASSET ALLOCATIONS											
Portfolio risk (%)	**Scenario #1**			**Scenario #2**			**Scenario #3**			**Scenario #4**		
	LPTs (%)	Shares (%)	Bonds (%)	LPTs (%)	Shares (%)	Bonds (%)	LPTs (%)	Shares (%)	Bonds (%)	LPTs (%)	Shares (%)	Bonds (%)
5.74	4	0	96	4	0	96	4	0	96	8	3	90
7.11	26	10	64	28	15	57	28	8	64	53	47	0
8.48	34	17	48	40	23	37	35	15	50	44	56	0
9.86	42	23	35	50	30	20	41	21	38	38	62	0
11.23	48	29	22	59	36	5	46	27	26	32	68	0
12.60	55	35	10	49	51	0	52	33	15	26	74	0
13.97	58	42	0	36	64	0	57	38	5	21	79	0
15.34	40	60	0	26	74	0	48	52	0	15	85	0
16.71	26	74	0	17	83	0	31	69	0	10	90	0
18.08	12	88	0	8	92	0	15	85	0	5	95	0
19.45	0	100	0	0	100	0	0	100	0	0	100	0

Figure 1: Correlation between LPTs and stockmarket: January 1980 - June 2000

Figure 2: Rolling correlation versus rolling risk: LPTs/shares

Figure 3: Rolling correlation versus rolling risk: LPTs/bonds