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**DIVERSIFICATION ISSUES IN
PROPERTY SECURITIES FUNDS**

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INTRODUCTION

Listed property trusts have been a highly successful indirect property vehicle in Australia over the last 15 years. This has seen property trusts having \$29.7 billion in total market capitalisation at December 1999, having increased significantly from only \$20.9 billion at December 1997 (Warburg Dillon Read, 2000).

While investors can invest in individual property trusts, property securities funds are also available as an investment option. These managed investment funds are unlisted vehicles that invest in a portfolio of listed property trusts. The advantages of property securities funds are the opportunity to invest in professionally managed funds and the ability to achieve significant spread or diversification across the spectrum of property trusts.

Currently, property securities funds are available in Australia from a wide range of institutional investors and funds managers. At June 1999, over 20 property securities funds were available (see Table 1), accounting for over \$3 billion in funds under management.

In terms of portfolio construction and portfolio risk management for property securities funds, a fundamental issue is how many property trusts should be included in the property securities fund portfolio. This issue of how many shares should be included in a diversified portfolio has been extensively debated in the finance literature for over 30 years (Elton and Gruber, 1977; Evans and Archer, 1968; Fischer and Lorie, 1970; Johnson and Shannon, 1974; Latane and Young, 1969; Lloyd and Haney, 1980; Lloyd, Hand and Modani, 1981; Lorie, 1975; Mokkelbost, 1971; O'Neal, 1997; Statman, 1987; Tole, 1982; Upson, Jessup and Matsumoto, 1975; Wagner and Lau, 1971). By simulating share portfolios of increasing size, most of these studies found that portfolios of 10-15 shares achieved most of the portfolio diversification and risk reduction benefits. However some studies (eg: Statman, 1987; Tole, 1982) found that 25-40 shares were needed to achieve sufficient portfolio diversification.

Similar portfolio risk reduction issues have been considered for property portfolios using both equal-weighted and value-weighted portfolios (Brown, 1988, 1991; Morrell, 1993; Schuck and Brown, 1997), with significantly more properties needed for value-weighted property portfolios to achieve comparable risk reduction to the level achieved for equal-weighted property portfolios.

Typically, the major property securities funds would have at least 10 and up to 25-30 property trusts in their portfolios from a total selection base of approximately 50 property trusts, with other key factors such as tracking error, weightings relative to index and maximum weightings also factored into their portfolio decision-making.

As such, the purpose of this paper is to:

- (i) conduct an extensive simulation study over 1994-98 to examine the impact of the number of property trusts in the portfolio on the portfolio risk reduction for Australian property securities funds.

- (ii) assess the impact of (i) above on the investment philosophy, portfolio construction and risk management procedures for property securities funds in Australia.

METHODOLOGY

Data sources

Monthly share prices and market capitalisations were obtained for 23 property trusts over the period of June 1994 – June 1999. These property trusts are shown in Table 2 with their market capitalisation at June 1999, having a total market capitalisation of \$19.9 billion which represents 71% of the total ASX property trust sector market capitalisation. Some major property trusts were omitted as they did not cover the full 5-year period of analysis; these include the Mirvac Group (\$1.68B), Westfield America Trust (\$1.37B), AMP Retail Trust (\$796M), AMP Office Trust (\$601M), Paladin Commercial Trust (\$386M) and Goodman Hardie Industrial Trust (\$370M).

Portfolio risk analysis

To assess the impact of the number of property trusts in the portfolio on portfolio risk, simulations were carried out using the following procedures:

- (1) Evans and Archer: equal weighted portfolio
- (2) Evans and Archer: portfolio weighted by market capitalisation.

Individual property trust annual risks over 1994-99 are given in Table 2, with these risks ranging from 12.31 to 16.83. Portfolios of increasing numbers of property trusts were constructed (portfolios of up to 23 property trusts) and the resulting portfolio risks determined. This procedure was repeated 1,000 times for each potential number of property trusts in the portfolio, with the average portfolio risk (from 1,000 simulations) then determined for each portfolio size (up to 23 property trusts).

Investment strategies

Details of the specific investment strategies adopted by 15 individual property securities funds were determined by personal interviews with funds managers by one of the authors (Padan) and from Property Investment Research (1999b). Issues relating to investment philosophy, portfolio construction and risk management procedures were assessed.

RESULTS AND DISCUSSION

Impact of number of property trusts on portfolio risk

Figure 1 presents the simulation results for the impact of the number of property trusts in the portfolio on portfolio risk for both equal-weighted and market capitalisation-weighted scenarios. Similarly Table 3 presents the percentage level of portfolio risk reduction achieved across the varying numbers of property trusts for both of the above scenarios.

With property trusts with higher market capitalisation tending to be more volatile, resulting from greater liquidity and tradeability on short term cycles (Upton, 1999), this is amply reflected in the correlations between average market capitalisation and risk being:

- top 10 market cap. LPTs : $r = .23$
- middle 10 market cap. LPTs : $r = -.29$
- bottom 10 market cap. LPTs : $r = -.22$,

compared to an overall correlation of .15. This results in the market capitalisation-weighted portfolio having higher portfolio risk levels than equal-weighted portfolios for all portfolio sizes. In both cases, Table 3 shows that the bulk of the portfolio risk reduction is readily achievable with portfolios of 8-10 property trusts. This is below the usually stated “10-15” shares from previous studies (eg: Evans and Archer, 1968).

Since the “averaging” process in the simulations to determine portfolio risk levels has been questioned by some researchers (eg: Tole, 1982), Table 4 presents the minimum and maximum portfolio risk levels achieved for each number of property trusts in the portfolio under both simulation scenarios. The variability about the average risk in each scenario is not significant across the number of property trusts in the portfolio. This does not indicate the need to increase the number of property trusts in the portfolio from the previously stated “8-10” to achieve the bulk of the portfolio diversification benefits.

Property securities funds investment strategies

How do the results of this simulation study match up with the practicalities of the investment strategies for the managers of property securities funds?

(1) Investment philosophy and management strategy

Most property securities fund managers used a bottom-up approach to individual property trust selection, with a top-down overlay of economic conditions and property markets. Management styles tended to be active rather than replicating market indices. This ensured disciplined methodologies (eg: quantitative modelling, ratio analysis etc) for property trust selection to capture underpricing opportunities, establishing overweight/underweight positions relative to index benchmarks and managing investment risk.

(2) Portfolio construction

A number of portfolio constraints were generally utilised by the property securities fund managers in constructing property trust portfolios. These include:

- minimum of 10 property trusts in fund, with up to 35 property trusts in fund
- maximum level of exposure to any one property trust; either by percentage of market capitalisation (eg: 5%, 10%) or linked to index weighting (eg: factor of 1.5 or double) or linked to quartiles in value rankings
- maximum level of property-related stock not in LPT index (eg: 5-10%)

- maximum level of cash (eg: 10%), with actual cash levels generally well below maximum (eg: 2-5%)
- minimum turnover rates (eg: \$3M monthly, 30% per annum)
- maximum tracking error against benchmark (eg: 1-1.5%, 2-3%).

Figure 2 presents the tracking error analysis for market capitalisation-weighted portfolios over 1994-98 using the Evans and Archer simulation procedure used previously. To achieve the tracking error levels indicated above, portfolios would need at least 20 property trusts (for 1 – 1.5% tracking error) or at least 10-15 property trusts (for 2 – 3% tracking error).

(3) Risk control and risk management

Barra reports were used by most property securities fund managers to measure performance against benchmarks and control risk factors. The Mercer and Frank Russell weightings were also used for benchmarking, with tracking error measured against the ASX LPT index benchmark.

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Table 1: List of major property securities funds: June 1999

Advance	Macquarie
AMP	MLC
ANZ	Paladin
APN	Perpetual
Australian Unity	Rothschild
BT	Salomon Smith Barney
Colonial First State	Tower
Commonwealth Property	Tyndall
County	UBS Brinson
Deutsche	Vanguard
Heine	Westpac
HSBC	Zurich

Source: Property Investment Research (1999a)

Table 2: List of property trusts in simulation study: June 1994 – June 1999

Property Trust	Market Capitalisation (\$M) (June 1999)	Annual Risk (%) (June '94 – June '99)
Westfield Trust	4,610	14.87
General Property Trust	3,676	16.34
Stockland Trust Group	1,457	13.54
Gandel Retail Trust	1,323	15.12
Schoders Property Fund	998	13.50
National Mutual Property Trust	942	15.24
Advance Property Fund	641	16.78
BT Property Trust	435	12.49
Schroders International Property	77 ⁽¹⁾	16.22
Centro Properties Group	503	14.13
Colonial First State Retail	347	16.83
Armstrong Jones Retail	280	15.67
Property Income Investment	537	13.36
Westpac Property Trust	526	14.14
BT Office Trust	485	12.31
Capital Property Trust	458 ⁽²⁾	15.63
Prime Credit Property Trust	497	13.64
Armstrong Jones Office	289	15.69
Capcount Property Trust	278	14.32
Prime Industrial Property Trust	602	15.15
Colonial First State Industrial	325	13.48
AMP Industrial Trust	361	13.44
Industrial Property Trust of Australia	238	14.78

(1): @ June 1998 (2): @ March 1999

Table 3: Percentage reduction in portfolio risk

Number of property trusts	Equal-weighted portfolio (%)	Market capitalisation -weighted portfolio (%)
1	n.a.	n.a.
2	14.69	12.65
3	20.42	15.78
4	23.22	18.03
5	25.00	18.78
6	26.43	18.98
7	27.19	19.12
8	28.01	19.39
9	28.48	19.80
10	28.76	19.59
11	29.03	19.93
12	29.51	20.14
13	29.78	20.14
14	29.99	20.20
15	30.19	20.07
16	30.33	20.27
17	30.40	20.00
18	30.60	20.34
19	30.67	20.20
20	30.81	20.34
21	30.87	20.40
22	30.94	20.27
23	31.01	20.40

Table 4: Variation in portfolio risk

Number of property trusts	Equal-weighted portfolio risk (%)				Market capitalisation – weighted portfolio risk (%)			
	Average	Min.	Max.	Range	Average	Min.	Max.	Range
1	14.69	13.54	15.57	2.03	14.69	13.54	15.57	2.03
2	12.43	11.87	13.07	1.20	12.89	12.13	13.82	1.69
3	11.61	11.39	12.22	0.83	12.34	11.80	13.30	1.50
4	11.16	11.05	11.72	0.67	12.09	11.54	13.01	1.47
5	10.88	10.77	11.35	0.58	11.94	11.84	13.43	1.59
6	10.69	10.53	11.11	0.58	11.89	11.61	13.20	1.59
7	10.56	10.47	10.82	0.36	11.85	11.62	12.90	1.28
8	10.46	10.45	10.79	0.35	11.82	11.57	12.77	1.20
9	10.39	10.38	10.76	0.39	11.79	11.47	12.58	1.11
10	10.33	10.31	10.13	0.21	11.77	11.32	12.39	1.07
11	10.27	10.13	10.43	0.30	11.75	11.39	12.13	0.74
12	10.23	10.20	10.45	0.25	11.74	11.34	12.06	0.71
13	10.20	10.18	10.39	0.21	11.73	11.32	11.97	0.65
14	10.17	10.14	10.55	0.41	11.73	11.42	12.52	1.10
15	10.13	10.12	10.47	0.35	11.71	11.70	12.39	0.69
16	10.12	10.09	10.50	0.41	11.72	11.69	12.35	0.66
17	10.10	10.08	10.37	0.30	11.72	11.62	12.27	0.65
18	10.07	10.06	10.37	0.31	11.71	11.63	12.20	0.57
19	10.06	10.06	10.34	0.28	11.70	11.57	12.11	0.54
20	10.05	10.04	10.31	0.27	11.71	11.51	12.04	0.53
21	10.03	10.02	10.19	0.17	11.71	11.62	11.88	0.25
22	10.02	10.01	10.10	0.09	11.71	11.57	11.82	0.25
23	10.01	10.01	10.01	0.00	11.70	11.70	11.70	0.00

Figure 1: Portfolio risk analysis by Evans/Archer procedure

Figure 2: Tracking error analysis by Evans/Archer procedure
