THE LONG-RUN PERFORMANCE AND DRIVING FORCES OF SECURITISED LISTED PROPERTY

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Abstract

In a comparison between Australian and United Kingdom property markets this article re-examines the long run performance of securitised property and its relationship with the equity and fixed income markets. The results show that Australian Listed Property Trusts perform very well in both high and low interest rate environments and total investment returns have remained relatively stable over the last decade. The study also indicates that the United Kingdom Real Estate Management & Development companies seem to perform better than their Australian counterparts. Cointegration test results provide a different perspective on the relationship securitised property has with the bond and equity markets, and sheds new light on their long-run interaction. For instance the outcomes suggest that, if structural breaks are taken into consideration, then it appears securitised Real Estate Management & Development properties are driven by both interest rate and stock market changes. Somewhat surprisingly the fixed income market is not a long-run driving force of Australian Property Trusts, even though they utilised more long-term debt to finance their business operations.

Key words: Australia, United Kingdom, Interest rate, Listed Property Trusts, Real Estate Management & Development, Securitised property, Stock market, Real Estate Investment Trusts.

1. Introduction

Securitised property has been subject to intensive research over the last two decades. Empirical research which mainly focuses on Real Estate Investment Trusts (REITs) has consistently shown that securitised property has outperformed other common stocks on a risk-adjusted basis. This indicates that there may be other driving forces of securitised property values compared to common stocks. Since securitised properties are listed on the stock exchange it is reasonable to expect that securitised property prices will be driven by the equity market. However, given that the underlying physical assets of securitised property are sensitive to interest rate changes, one would strongly suspect that the fixed income market is the main driving force of securitised property prices. Therefore, for securitised property, one might ask the question whether securitised real estate is driven by the fixed income market or the stock market?

This question cannot simply be answered by examining the contemporaneous correlation among securitised property markets, equity markets and fixed income markets. The reason is that correlation analysis ignores the long run non-linear economic relationship linking all financial variables. Numerous studies have documented that simple correlations among financial asset returns are not very useful for both asset allocation decisions and hedging strategies, and contemporaneous correlations always increase when market volatility increases (King and Wadhwani; 1990, Lee and Kim, 1993; Longin and Solnik, 1995). As discussed in Darrat and Zhong's (2002) study, even though emerging markets (especially India, Pakistan and Sri Lanka) have very low correlations with the USA and Japan, these emerging markets are permanently driven by both the USA and Japanese equity markets.

This paper will attempt to identify real estate driver/s by using cointegration tests that account for structural breaks to test for the permanent and transitory components among error-corrected vector autoregressive systems. By decomposing securitised property price behaviour into components that are driven by interest rates and the stock market, a more precise picture can be developed as to the importance that these explanatory factors have in driving the long-run trend of securitised property. This is performed on Real Estate Investment Trusts (REITs) in Australia (known as Listed Property Trusts) and Real Estate Management & Development companies (REMDs) in Australia and the United Kingdom.

The remainder of this paper is organised as follows: section 2 pursues a brief literature review on securitised property, followed by Data and Methodology in section 3. Empirical results and discussions will be provided in section 4 while section 5 will conclude the article.

2. Literature Review

Empirical evidence has consistently shown that securitised property provides lower returns than other common stocks. However, when risk is taken into consideration, securitised property tends to outperform other equity stocks (Mueller, Pauley et al. 1994; Ghosh, Miles et al. 1996; Chen and Peiser 1999; Hartzell, Stivers et al. 1999; Clayton and MacKinnon 2001; Sing and Ling 2003). Moreover, the inclusion of securitised property in an investment portfolio will usually enhance the portfolio return and/or reduce the portfolio risk (Brueggeman, Chen et al. 1984; Mueller, Pauley et al. 1994; Chen and Peiser 1999; Hartzell, Stivers et al. 1999; Clayton and MacKinnon 2001). All these advantages as offered by securitised property, which are not available to other common stocks, indicating that there may be different driving forces of the securitised property returns compared to other common stock returns. Past research indicates that high dividend yield stocks, for example utilities, are sensitive to interest rate movements (Bower, Bower et al. 1984; Sweeney and Warga 1986). Hence, the payout features of securitised property may lend itself to follow the bond market more closely than the equity market. In addition, given that the loan rates set in the fixed income market will have a large effect on the demand for residential and commercial properties, and thereby prices, one would strongly suspect that securitised property prices are driven by interest rate changes rather than the stock market.

Extensive research, which mainly focuses on REITs, has been conducted to examine the impact of interest rate and stock market changes on securitised property prices. Swanson, Theis and Casey (2002) report that the stock market seems to explain securitised property values better than interest rate changes. Their results support the evidence that interest rate changes have become less important over time. Nevertheless, Swanson et al. (2002) find strong indications that securitised property values are sensitive to maturity rate spread. Glascock, Liu and So (2000) found that REITs and interest rates were cointegrated prior to 1993. After 1992, REITs were less sensitive towards interest rate changes and behaved more like small capitalization stocks. Conversely, Allen, Madura and Springer (2000) show that REITs are still sensitive towards short-term and long-term interest rate changes. Especially for Equity REITs, interest rates are more important in explaining property prices. They also provide evidence that REITs cannot change their interest rate exposure through asset structure, financial leverage or management strategy. However, as shown in the article, managers can minimize the stock market influence by lowering REITs' financial leverage. This suggests that the financial makeup of a firm can modify the sensitivity towards stock market changes.

Given that there have been significant changes in the global financial market over the last decade, care should be taken when making any inferences from the previous literature. The incomparable performance of securitised property prices may be partly driven by the low interest rate environment of the 1990s. At the moment, it is unclear whether the real estate industry can perform in a relatively high interest rate environment like Australia[1]. Perhaps a more important question is whether the real estate industry is driven by the fixed income market or the stock market. Understanding the long run driving forces of securitised property is very important for asset allocation decisions.

This paper will decompose the long-run relationship that may exist between real estate, interest rates and stock market prices into permanent and transitory components in an attempt to determine the primary driving force behind securitised real estate returns. In particular, the decomposition will be able to distinguish the contribution of the bond and stock markets to both long-run behaviour and short-term cycles within the securitised property market. This will allow for an explicit consideration of the relative impact that the bond and stock markets have upon securitised property market behaviour.

Johansen (1991) showed how to examine the long run relationship among a group of variables so as to extract information on which of these variables could always be considered part of the cointegrating space, but would not be influenced by other variables within that space. This is accomplished by placing restrictions on the cointegrating coefficients along with the coefficients that adjust the system back to long run equilibrium once a disturbance has occurred. The methodology was extended by Gonzalo and Granger (1995). In the context of this paper the procedure permits the decomposition of any long-run equilibrium relationship that may exist among real estate, interest rate and stock market variables into permanent and transitory components. The application of this decomposition procedure will allow us to isolate price `leaders' or `drivers' among this group of variables over the long term. In particular it will allow us to consider explicitly the relative impact that the bond and stock markets have on securitised real estate.

A potential disadvantage of pursuing this decomposition exists if there is a structural break in the cointegrating relationship since research by Gregory and Hansen (1996) and Inoue (1999) has shown that one or more breaks can yield misleading results on cointegration. To deal with this issue we implement the Inoue (1999) methodology that tests for cointegration in the presence of a possible break within a multivariate system. This is in preference to the Gregory and Hansen (1996) approach which is a two step procedure in the same vein as the original Engle and Granger (1987) two step approach that requires a prior specification of the left- and right-hand side variables. By way of contrast the Inoue (1999) method is a Johansen (1988,1991) type test

[1] For instance, over the study period average interest rates were nearly one percent higher in Australia compared with the UK

that does not require the structure of the system to be specified *a priori*, nor does it require imposition of a break *a priori*, rather it tests this endogenously. Once the number of cointegrating vectors (if any) are extracted this information is then combined with a decomposition of the components of the cointegrating model following the methods of Gonzalo and Granger (1995). Pursuit of the Inoue (1999) approach is important because other research has indicated that there has been a shift in the sensitivity of securitised property to interest rate changes (cf. Glascock et.al. (2000)). This may have come about due to structural change that a conventional Johansen (1991) procedure cannot deal with. The procedures adopted here are briefly reviewed in the next section.

3. Data and Methodology

3.1 Data

In order to determine the permanent and transitory drivers of securitised real estate returns, a long time-span dataset is desirable for a reliable cointegration analysis. For this research, weekly data is extracted from the DataStream Database, beginning July 1998 until June 2006 (419 observations). To be more specific, three real estates indices were created using the DataStream platform to represent both REITs[2] and REMDs[3] in Australia, as well as REMDs in the United Kingdom[4]. The proxies for the Australian equity market (All Ordinaries), the United Kingdom equity market (FTSE 350) and interest rates (ten-year government bond yields) were taken from the DataStream Database as well.

It is important at this stage to emphasize the reasons why the two sub-industries of real estate in Australia (REITs and REMDs) are examined. Both REITs and REMDs are heavily involved in the real estate market. However, these companies are significantly and fundamentally different from one another. The REITs in Australia engage in the acquisition and ownership of property and primarily derive their income from rental or leasing[5] whereas REMDs are mainly involved in the development and management of real estate properties. Given that rental revenues are usually relatively stable, REITs tend to be perceived as a low risk investment vehicle. Furthermore, unlike REMDs, REITs are not required to pay company tax, but they need to distribute at least 90 percent of their reported earnings to their unit holders. The financing activities of REMDs and REITs are significantly different as well. The REMD company can rely on internally generated funds to finance their investment opportunities, but REITs will usually have to use external funds

[2] Global Industry Classification Standard code 404020
[3] Global Industry Classification Standard code 404030
[4] All securitised property companies in United Kingdom are classified as Real Estate Management & Development according to the Global Industry Classification Standard. REIT like structures only began operating in January, 2007.
[5] To be more specific, all REITs in Australia are further classified as Equity REITs, which includes Diversified REIT, Industrial REIT, Office REIT, Residential REIT, Retail REIT and Specialized REIT.

to support their business expansion given that most of their operating incomes have been distributed to their shareholders.

The primary reason the sample dataset starts at the beginning of July 1998 is to avoid potential contamination from the Asian financial crisis which occurred at the beginning of 1997. A weekly dataset is chosen to avoid any potential non-synchronous, thin trading and bid-ask spread problems arising from daily series analysis. Given that real estate companies tend to utilise more long-term debt to finance their business operations, a long-term interest rate is applied in the cointegration analysis. The use of a long-term interest rate in this study is also consistent with previous research findings such as He et al. (2003), which find that REIT returns are more sensitive toward long-term interest rate changes. The liabilities structure of the real estate industry will be discussed in the following section.

3.2 Methodology

This paper combines a number of econometric processes in a vector error corrected framework viz. the Inoue (1999), Gonzalo and Granger (1995) and Johansen (1991) procedures are used as we formally isolate permanent and transitory components of each system under study. Please refer to Cheong *et al.* (2006), Gonzalo and Granger (1995), Inoue (1999) and Johansen (1991) for the detailed discussion of structural breaks and the cointegration tests.

For all results presented in the empirical section, there are three time-series within each `system' viz: an unanticipated interest rate, an orthogonalised market index and a real estate index. Use of the unanticipated interest rate is important since it ensures that our model captures unexpected rate changes not otherwise taken into account. This filters out expected interest rate movements that may also be reflected in general stock market trends. We capture unanticipated interest rates as follows. Autoregressive Integrated Moving Average (ARIMA) processes are used to model the rates, with the Schwarz criterion (SC) used to set the model order. An ARIMA (1,1,1) model was chosen for Australia and ARIMA (0,1,1) model for the United Kingdom. These models were then used to generate forecasts of interest rate changes, where unanticipated interest rate changes were calculated based on the difference between the actual and the expected (i.e forecast) interest rate movements.

Use of an orthogonalised market index allows us to deal with exogeneity issues. For example, because of the inter-relationship that the fixed income and equity markets share with each other, it is important to ensure that each time series represents separate features. For instance, property stock values may change due to stock market changes, which indirectly may be a result of changes in the interest rate. However, property returns may also directly react to changes in the ten-year government bond yield. Consequently, and consistent with previous studies (see Fraser, Madura and Weigand, 2002), we orthogonalise market returns against interest rate changes to eliminate potential multicollinearity problems. We do this by taking the residuals from the regression of the market returns on unanticipated interest rate changes and use these as orthogonalised market returns. Under this process, the regression slope coefficient will be an unbiased estimate of the sensitivity between securitised property returns and market returns.

Tests for Cointegration in the Presence of Potential Breaks

To test for long run equilibrium in the presence of possible structural breaks in the cointegrating relationship this study adopts the procedure developed by Inoue (1999). The Inoue (1999) methodology is somewhat similar to the Zivot and Andrews (1992) univariate procedure in that it uses dummy variables to represent breaks in level, trend or both. These dummy variables are sequentially introduced across time periods and Johansen type trace and maximum eigenvalue statistics are produced so as to test for cointegration in the presence of possible breaks within that time period. Specifically the trace statistic is:

$$\sup_{\xi\in\Xi}\{-T\sum_{j=r+1}^{T} \ln\,(1-\hat{\lambda}_j^i(\xi))\}.$$

and the maximum eigenvalue statistic is:

$$\sup_{\xi\in\Xi}\ \{-T\ \ln(1-\hat{\lambda}_{r+1}^i(\xi))\}$$

where T is the sample size, ξ is the break fraction, considered over a closed subset of the sample period and $\hat{\lambda}_1^i(\xi) \geq \hat{\lambda}_2^i(\xi) \geq \ldots \geq \hat{\lambda}_n^i(\xi)$ are solutions to a generalized eigenvalue problem that is presented in detail in Inoue (1999). We note that the nature of the algorithm `uses up' 30% of the data in the estimation process. Inoue (1999) provides asymptotic critical values for these test statistics which are different from the Johansen critical values. The value of the Inoue (1999) approach is that it is subjective in the determination of potential breakpoints that might influence the outcome of results from the trace and maximum eigenvalue tests. This approach differs from research such as that by Darrat and Zhong (2000) who subjectively impose breakpoints in their study on driving forces within Asia-Pacific stock markets.

Similar to Johansen (1991) the Inoue (1999) procedure produces a cointegration matrix that can be broken down into parameter matrices containing the cointegrating coefficients and the speed of adjustment coefficients. Individual and joint restrictions placed on the coefficients in these matrices allow tests to isolate components that are part of the cointegrating space but exhibit `weakly exogenous' behaviour[6]. Any component of the system that is found to be part of the long run equilibrium but is found to be weakly exogenous (i.e. has no levels feedback to the system)

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[6] For a detailed discussion see Gerlach et.al. (2006).

can be thought of as a `driver' of the system. That is, the given component is influencing the long run equilibrium of the system but is not influenced by what is occurring within the system.

Identifying and Testing for Permanent and Transitory Factors

Gonzalo and Granger (1995) extended the work of Johansen (1991) in that they illustrated how any cointegrated system can be uniquely represented as the sum of permanent and transitory components. Later, Darrat and Zhong (2000) illustrated how to test whether given component series within a particular system are the major drivers of the common permanent component, or just a transitory short run driver, of the system.

Johansen (1991) showed how to test whether certain linear combinations of *X* were transitory factors. He developed a likelihood ratio statistic that follows a chi-square distribution. The null hypothesis in the test is given by:

$$H_0 : \alpha = HM_H$$

The purpose is to determine whether the cointegrating vectors α are significantly different from a specific linear combination, described by the matrix *H*, of the set of eigenvectors M_H. The matrix *H* is typically chosen so as to isolate and ignore the eigenvector corresponding to a single component of *X.* Rejecting the hypothesis above implies that this single series is a significant *transitory* driver of the system.

Extending this line of thought Gonzalo and Granger (1995) showed how to test whether linear combinations of *X* are permanent drivers of the system. The likelihood ratio test statistic developed by these researchers similarly follows a chi-square distribution. The null hypothesis associated with this test is given by:

$$H_0 : \gamma_{\perp} = GM_G .$$

The purpose is to determine whether the matrix of vectors orthogonal to the adjustment matrix γ are significantly different from a specific linear combination described by the matrix *G*, of the set of eigenvectors M_G. Typically the matrix *G* is chosen to isolate the eigenvector corresponding to a single component series of *X*. Rejecting the null hypothesis implies that this single series is a significant permanent driver of the system.

4. Empirical Results

4.1 The Assets & Liabilities Structure

Table 1 provides a brief summary of the assets and liabilities of real estate companies in Australia and United Kingdom. The Australian REITs have grown tremendously over the last decade, accumulating more than AUD $155 billion assets in 2005. Alternatively, Australian REMDs have grown relatively slower, with AUD $21 billion assets only. For the United Kingdom, REMDs have accumulated approximately £338 billion assets, which is more than double the size of the Australia real estate industry. Nevertheless, the UK real estate industry has grown relatively slower than the real estate industry in Australia.

As shown in table 1, more than 50% of securitised property total debts in Australia and United Kingdom are considered as long term debts. To be more precise, about 84% of the REITs' debts are classified as long-term debts and 70% for REMDs in Australia. In the UK, approximately 63% of REMDs' debts are classified as long-term debts. These results are also consistent with the previous argument that long-term interest rate should be utilised in the cointegration analysis. Since REITs tend to employ more long-term debt in their business, it is not surprising that previous studies find REIT returns are more sensitive toward long-term interest rate changes (see He et al., 2003).

REITs utilise more long-term debt relative to short-term debt (83% vs. 17%) to finance their business operations. This may be partly due to the fact that REITs' business risk is relatively lower than the REMDs, therefore permitting companies to utilise more long-term debt. On the other hand, 30-40% of the REMDs' total debts are classified as short-term debt in Australia and the UK. Given that REMDs' business operations are relatively more volatile and are dependent on the business cycle, it is reasonable to expect that the REMDs employ more short-term debts in order to avoid any idle cash sitting in the bank when there is an unexpected downturn in the economy.

The average leverage ratios (total debt divided by total assets) for Australian REITs, REMDs and United Kingdom REMDs are 26%, 22% and 27% respectively. The leverage ratio seems to be much higher for the later part of the sample (2002-2006). This may be an indication of the maturity of the real estate industry, as mature corporations tend to have a much higher leverage ratio.

Table 1: The Asset & Liability Structure of Securitised Real Estate Companies in Australia and United Kingdom

AUS REITs (AUD)

	Total Assets	*Total Debt*	*Total Long Term Debt*	*Total Long Term Debt / Total Debt*	*Total Debt / Total Assets*
1997	$7,878.93	$1,319.57	$1,139.51	86.35%	16.75%
1998	$10,964.07	$1,807.33	$1,661.01	91.90%	16.48%
1999	$14,290.30	$2,474.84	$1,983.04	80.13%	17.32%
2000	$17,482.58	$3,287.68	$2,854.27	86.82%	18.81%
2001	$22,543.03	$5,411.77	$3,622.48	66.94%	24.01%
2002	$25,151.29	$6,009.57	$5,157.73	85.83%	23.89%
2003	$35,423.53	$10,072.16	$8,467.05	84.06%	28.43%
2004	$89,944.38	$31,602.20	$27,915.69	88.33%	35.14%
2005	$131,892.07	$50,606.81	$43,528.28	86.01%	38.37%
2006	$155,620.80	$57,030.46	$47,342.04	83.01%	36.65%
Average				*83.94%*	*25.58%*

AUS REMDs (AUD)

	Total Assets	*Total Debt*	*Total Long Term Debt*	*Total Long Term Debt / Total Debt*	*Total Debt / Total Assets*
1997	$4,574.77	$117.31	$117.31	100.00%	2.56%
1998	$6,349.96	$1,572.17	$1,343.42	85.45%	24.76%
1999	$7,748.26	$1,390.47	$496.19	35.68%	17.95%
2000	$12,824.26	$1,849.18	$1,335.45	72.22%	14.42%
2001	$11,500.02	$2,472.50	$1,841.23	74.47%	21.50%
2002	$12,809.75	$2,673.57	$2,050.09	76.68%	20.87%
2003	$12,679.91	$3,066.74	$2,100.20	68.48%	24.19%
2004	$13,689.58	$3,681.06	$2,630.57	71.46%	26.89%
2005	$15,596.50	$4,691.35	$2,728.04	58.15%	30.08%
2006	$20,646.94	$7,250.18	$4,196.89	57.89%	35.12%
Average				*70.05%*	*21.83%*

UK REMDs (GBP)

	Total Assets	*Total Debt*	*Total Long Term Debt*	*Total Long Term Debt / Total Debt*	*Total Debt / Total Assets*
1997	£94,602.79	£13,678.21	£11,666.01	85.29%	14.46%
1998	£128,446.61	£23,203.66	£15,217.61	65.58%	18.06%
1999	£141,411.46	£26,192.97	£17,170.14	65.55%	18.52%
2000	£157,916.00	£36,298.58	£21,961.65	60.50%	22.99%
2001	£163,355.36	£39,274.76	£25,503.49	64.94%	24.04%
2002	£168,710.16	£45,189.43	£28,492.42	63.05%	26.79%
2003	£191,429.74	£55,838.74	£32,120.69	57.52%	29.17%
2004	£236,417.79	£76,870.51	£41,122.79	53.50%	32.51%
2005	£265,736.25	£96,760.38	£47,026.46	48.60%	36.41%
2006	£337,799.11	£144,850.25	£100,293.55	69.24%	42.88%
Average				*63.38%*	*26.58%*

Source: Thomson ONE Financial Database

- Total Long Term Debt represents debt obligations due more than one year from the company's Balance Sheet date or due after the current operating cycle.
- Total Debt represents all interest bearing and capitalized lease obligations. It is the sum of long and short-term debt.
- Total Assets represents current assets plus net property, plant, and equipment plus other non-current assets (including intangible assets, deferred items, and investments and advances).

4.2 Performance of Securitised Property

Table 2: The Performance of Real Estate Companies in Australia and United Kingdom from 1998 to 2006

	AUS REITs			AUS REMDs			UK REMDs		
	Total Return	*Capital Gain*	*Dividend Yield*	*Total Return*	*Capital Gain*	*Dividend Yield*	*Total Return*	*Capital Gain*	*Dividend Yield*
1998-2006	**166.4%**	**73.1%**	**93.3%**	**64.4%**	**18.9%**	**45.6%**	**171.3%**	**109.4%**	**61.9%**
1998-1999	11.8%	6.3%	5.6%	33.8%	28.5%	5.3%	-5.4%	-9.0%	3.5%
1999-2000	11.5%	5.8%	5.7%	6.9%	3.0%	3.9%	2.9%	-0.8%	3.7%
2000-2001	15.8%	9.8%	6.0%	-30.5%	-33.2%	2.7%	13.0%	9.3%	3.7%
2001-2002	13.5%	7.7%	5.8%	-12.6%	-15.3%	2.7%	6.2%	2.7%	3.5%
2002-2003	10.4%	4.3%	6.1%	-4.1%	-7.4%	3.3%	-4.7%	-8.3%	3.7%
2003-2004	9.3%	3.2%	6.1%	26.3%	21.3%	5.0%	42.3%	37.8%	4.5%
2004-2005	14.7%	9.3%	5.4%	18.7%	13.0%	5.7%	32.0%	28.8%	3.2%
2005-2006	17.4%	10.6%	6.8%	31.6%	25.0%	6.6%	29.7%	26.9%	2.8%
Geometric Mean	13.0%	7.1%	5.9%	6.4%	2.2%	4.4%	13.3%	9.7%	3.6%
Arithmetic Mean	13.1%	7.1%	5.9%	8.8%	4.4%	4.4%	14.5%	10.9%	3.6%

Note: Dividend yield = Total Return – Capital Gain

Table 2 (above) provides an overview of the performance of securitised property in Australia and the UK. It is interesting to observe that REITs outperformed the REMDs in Australia over the sample period. The total return of AUS REITs is approximately 166%, which is 102% higher than the AUS REMDs for the 8 year period. However, AUS REMDs outperform AUS REITs from 2003 onwards (see Figure 1). From a visual comparison (see Figure 2), it is clear that the AUS REITs offer higher and more stable dividend yields than AUS REMDs. Moreover, the historical AUS REITs' total returns are much more stable than AUS REMDs as well (see Figure 1). This reinforces the previous statement which is discussed in section 3 that AUS REITs have lower business risks than AUS REMDs in Australia. Furthermore, with the exception of the 2003 total return (9.3%), AUS REITs have been generating more than 10% total return on a yearly basis over the last 8 years. On the other hand, the yearly total returns of AUS REMDs range from negative 30.5% to positive 33.8% over the sample period. Also, the standard deviation of AUS REMDs is much higher than the REITs. The outstanding performance of AUS REITs may well explain why the REIT industry has been expanding enormously over that last decade; on average, AUS REITs' total assets have been growing at an annual rate of 39%[7].

[7] From $7.9b to $155.6b in 9 years period. The geometric growth rate is 39.30%.

Comparing REMDs in Australia with REMDs in the United Kingdom, UK REMDs outperform the AUS REMD immensely, producing 13.3% on average (geometric mean) rather than 6.4% in Australia. The UK REMDs' total returns are much steadier as well. However, the dividend yield is relatively lower in the UK than for AUS REMDs. Perhaps there are more investment opportunities in United Kingdom and therefore UK REMDs prefer to have a higher retention rate.

Overall, UK REMDs have produced the highest total return among the three securitised property markets. However, when risk[8] is taken into consideration, AUS REITs seem to outperform other securitised real estate investment. AUS REITs offer relatively stable attractive returns as well as high dividend yields.

Figure 1: Total returns

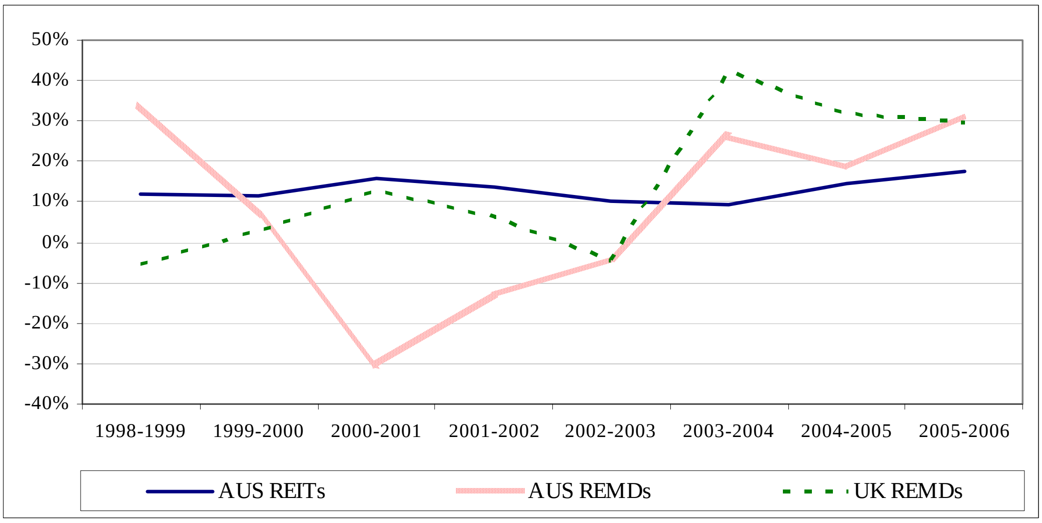
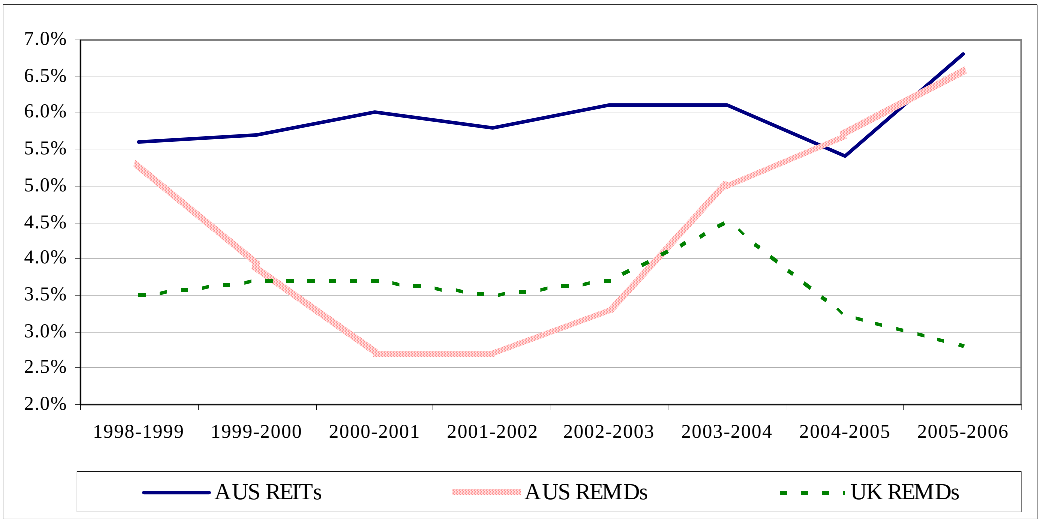


Figure 2: Dividend Yields



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[8] The volatility of the total returns

4.3 Descriptive Statistics

Table 3: Descriptive Statistics of Real Estate Companies in Australia and United Kingdom (1998 – 2006)

AUSTRALIA		**REIT**	**REMD**	**Market Index**	**Interest Rate**
Mean		0.0013	0.0005	0.0016	-0.0005
Std. Dev.		0.0153	0.0298	0.0159	0.0238
Skewness		-0.4045	-1.6270	-0.0737	0.0758
Kurtosis		5.2247	15.5877	4.9478	4.1245
Jarque-Bera Test		97.83**	2951.12**	66.62**	22.42**
Observations		419	419	419	419
ADF	Level	-0.6613	-1.3149	-0.7909	-2.0094
test	1st diff	-23.16**	-21.87**	-20.66**	-20.60**

UNITED KINGDOM		**REMD**	**Market Index**	**Interest Rate**
Mean		0.0023	0.0005	-0.0002
Std. Dev.		0.0206	0.0213	0.0229
Skewness		-0.3585	-0.3558	0.0379
Kurtosis		4.3993	4.9243	6.0043
Jarque-Bera Test		43.16**	73.49**	157.67**
Observations		419	419	419
ADF	Level	0.4318	-1.2098	-2.9174
test	1st diff	-18.56**	-19.79**	-20.19**

All statistics are from logarithmic differences, except for the ADF test in levels, which are based on log prices. The Jarque-Bera test is a test for normality and is χ^2 distributed with 2 degrees of freedom. Augmented Dickey-Fuller (ADF) tests with intercept were performed on logarithmic values (levels) and their first differences (returns). **Indicates rejection of the null at the 1% level.

Table 3 (above) shows the descriptive statistics for all time series which are utilised within the cointegration analyses. With the exception of the long-term interest rates, the average weekly returns are positive values and are negatively skewed for the time frame 1998 to 2006. All series have excess kurtosis and Jarque-Bera tests show that all series are not normally distributed. According to the Augmented Dickey-Fuller (ADF) test, all series are stationary in first differences.

4.4 Inoue Test Results

Table 4: Inoue and Johansen Rank Tests

	H_0:	Johansen test		Inoue test	
		λ_{Max}	λ_{Trace}	λ_{Max}	λ_{Trace}
AUS REIT	r = 0	15.13	22.28	42.39 *	60.59
				(16-Aug-2002)	
	r ≤ 1	7.07	7.15	24.15	33.06
	r ≤ 2	0.08	0.08	13.11	13.11
AUS REMD	r = 0	16.77	23.62	61.46 **	98.44 **
				(8-Dec-2000)	
	r ≤ 1	5.43	6.85	29.99	38.55
	r ≤ 2	1.42	1.42	12.02	12.02
UK REMD	r = 0	15.36	17.75	39.59	66.91 *
				(30-May-2003)	
	r ≤ 1	2.1	2.38	19.13	29.37
	r ≤ 2	0.29	0.29	10.8	10.8

Critical values for the trace and maximum eigenvalue statistics allowing for slope change (Inoue model B) are taken from Inoue (1999). The lag order used for the tests were determined by sequential LR tests on the lags. Break point dates (DD-MMM-YYYY) for the Inoue tests are presented in brackets under the last significant test statistic. **Indicates rejection of the null at the 1% level, and *indicates rejection of the null at the 5% level.

Table 4 (above) reports the results for both the standard Johansen Rank test and Inoue (1999) test for the trivariate system of property market index, long-term interest rate and stock market index. According to the standard Johansen eigenvalue and trace tests, there is no cointegration within each trivariate model. This suggests that securitised property is a unique financial asset and it does not share a common stochastic process with the equity market and/or the bond market. Thus, the inclusion of the securitised property will further enhance the portfolio return and/or reduce portfolio risk i.e. there are asset diversification benefits. However, given that the sample period stretches over 8 years, it is unrealistic to expect no structural break point within each trivariate system. According to the Inoue test, there is at least one cointegrating equation in each system when the possibility of a structural break is taken into consideration. Specifically, there is a strong cointegrating relationship linking Australian REMDs, interest rates and the stock market index. The maximal eigenvalue and the trace statistics reject the null hypothesis of no cointegration at the 1% level. Overall, the Inoue results suggest there is a long run relationship binding each securitised property index with both the stock market and the fixed income market. Ignoring structural breaks in any cointegrating system may lead to erroneous inferences.

4.5 Permanent-Transitory Decomposition

The Inoue results reveal that there is a long run relationship within each trivariate system of securitised property, interest rates and the equity market. These results, however, do not provide sufficient information on whether the equity market or the fixed income market is driving the real estate stock price movements. Using the procedures proposed by Gonzalo-Granger (1995), and allowing for one structural break point, the trivariate cointegrating system is decomposed into permanent and transitory components. An interesting feature emerges from the results which are tabulated in Table 5 (below). The equity market is considered to be both the permanent and transitory driver for all securitised properties in Australia and the UK. With the exception of Australian REITs, long-term interest rates are also the permanent and transient determination of prices for securitised property. The fixed income market is not a long run driving force for Australian REITs. This result is consistent with the previous literature which reveals that interest rate movements have less impact on securitised properties (Glascock et al, 2000; Liang et al., 1995; Mueller and Pauley, 1995). Perhaps, the REITs industry is maturing and is behaving more like general stock!

Table 5: Gonzalo-Granger Permanent-Transitory Test

	Interest Rate		**Market**	
	Permanent	**Transitory**	**Permanent**	**Transitory**
AUS REITs	3.6756	7.2069 **	11.0049 **	4.1197 *
AUS REMDs	18.8396 **	4.0647 *	12.3033 **	14.1513 **
UK REMDs	15.0555 **	5.6836 *	18.20 **	5.2539 *

The statistics presented are χ^2 distributed with 2 degrees of freedom for the permanent components and 1 degree of freedom for the transitory component. **Indicates rejection of the null at the 1% level, and *indicates rejection of the null at the 5% level.

Understanding the permanent and transient driving forces of securitised property indices is crucial for both Strategic and Tactical asset allocation decisions. Long term investors may perhaps consider incorporating AUS REITs and AUS REMDs in their portfolio given that interest rate is not the main driving forces of AUS REITs. In contrast, it may not be a wise decision to invest in both Australia REMDs and UK REMDs for asset diversification if both countries have similar financial circumstances (for example: interest rates are moving in the same direction). Understanding the transient driving forces will provide opportunities to investors for short-term capital gains as well.

5. Conclusion

This paper re-examined the performance of securitised property and its relationship with the equity market and fixed income market. Previous literature has shown mixed results on the influence that equity and fixed income have over property, although the majority of studies have suggested the influence of interest rate movements has diminished. The results of this study suggest that, once structural breaks taken into consideration, Real Estate Management & Development security prices are shown to have a long-run cointegrative relationship with both the equity market and long-term interest rates. Even though Real Estate Investment Trusts utilise more long-term debts than REMDs to finance their business operations, REITs are not cointegrated with the bond market. This result is consistent with the majority of studies which find that interest rate changes have less influence on REITs over long period of time. In the short-term, the results suggest that both stock market and interest rate movements seem to be just as important in explaining variations in property prices. Furthermore, REITs seem to perform well in both high and low interest rate environments. Total investment returns have remained relatively stable over the last decade. Notwithstanding the outcomes from this paper, further research is still needed to explain the relationship securitised property has with the fixed income and equity markets.

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