

## AUSTRALIAN INTEREST RATE MOVEMENTS AND A-REITS PERFORMANCE: A SECTORAL ANALYSIS

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### ABSTRACT

*With interest rates at an all-time low in Australia, investment managers are quickly adjusting tact and constantly seeking feed to maximise return. Many have traditionally resorted to the Australian real estate investment trusts (A-REITs) as a means to growing return. A-REITs are listed property investment vehicles that constitutes around A\$125 billion (10%) of the total Australian share market value. The A-REITs have been popular for yielding some of the best returns until 2009, when the global financial market collapse led to 70% fall in value from a peak of A\$148 billion. A-REITs with higher debt levels were significantly affected which lead to the collapse and recapitalisation of several leading A-REITs. Since the GFC, with low interest rates the A-REITs have performed well compared to the broader stock and bond markets. This paper will seek to further investigate this relationship by analysing the trends in Australian interest rate cycles and A-REITs performance using the capital asset pricing model. In particular, it will review performance data across five A-REITs sectors: diversified, industrial, retail, office and specialised (non-core) REITs.*

*The analysis was undertaken over a 20 year period (1995-2015) involving A-REIT returns, macro-economic data, with the 90-day bank bill yield and 10-year government bond yield rates used respectively for short-term and long-term interest rate proxies. Findings indicate that both the diversified and retail sector exhibit strong relationship to market risk, short and long-term interest rates. Rising short-term interest rates contribute to positive returns while rising long-term interest rates result in lower returns. However, the impacts of movements in interest rates on industrial, specialised (non-core) and office sectors were not well explained by the asset pricing model. This could due to the relatively small size of these funds. Overall, the results suggests that gearing levels and by extension costs of debt, do play a significant role in the returns generating process. Highly leveraged funds performed better under rising short-term interest rates compared to those with lower leverage, which may be a result of improved rental yields associated with periods of economic growth.*

Keywords: Interest rate, REITs, Australia, property investments, capital structure, bonds.

### INTRODUCTION

The A\$125 billion Australian real estate investment trusts (A-REITs) is the second largest global listed property sector, behind United States. A-REITs were formally known as Listed Property Trusts (LPTs) that have a long established history in the Australian stock market since 1971. A-REITs are popular investment options for both institutional and retail investors seeking regular income and capital growth. By definition, A-REITs are professionally managed vehicles that, in return for a fee, specialise in investing in properties and the management of the portfolio on behalf of investors. Initially, A-REITs almost exclusively owned properties only. However, from the late 1990s, some trusts have diversified into other activities, such as funds management and property development (Rowland 2010).

Each A-REIT will have its own fund characteristics, that is, the trust properties selected are usually diversified across regions (inter-state, global), lease lengths and tenant types. Traditionally, the A-REITs market were divided into office, retail, industrial and diversified. However, in the past few years, the investment choices of listed property funds have expanded to include healthcare properties, retirement properties, storage facilities and childcare centres. A-REITs now hold property interest across five particular sectors:

- *Diversified* trusts - invest in a mixture of industrial, offices, hotels and retail properties.
- *Office* trusts - include medium to large-scale office buildings in and around major cities.
- *Retail* trusts - invest in shopping centres and similar assets.

- *Industrial* trusts - invest in warehouses, factories, and industrial parks.
- *Specialised* trusts – invest in non-core property sectors such as hotel and leisure, healthcare, residential and childcare.

(Source: ASX 2016)

The ongoing consolidation of funds since the late 1990s through mergers and acquisitions has resulted in the number of A-REITs declining from 71 in December 2006, to 48 in February 2016. As a result, the market has become more concentrated with fewer A-REITs dominating the sector. The top ten leading A-REITs accounted for approximately 80% of the A-REIT sector total market capitalisation, as at February 2016. This can be compared to the share of top ten funds during December 1999, which accounted for only 63% of the total A-REIT market capitalisation. Westfield's retail funds: Scentre Group (A\$23.3 billion) and Westfield Corporation (A\$20.8 billion) are the largest A-REITs listed on the ASX, with a combined market capitalisation of approximately A\$44 billion. Another retail fund, Vicinity Centres (A\$12.3 billion), formerly Federation Centres is the third largest A-REIT. Industrial sector based Goodman Group (A\$11.5 billion) and diversified fund, Stockland (A\$9.9 billion) round up the top five largest A-REITs. Investa Office Fund Group (A\$2.4 billion) and Ardent Leisure Group (A\$1.1 billion) are the largest office and specialised sector A-REITs respectively (ASX 2016).

The A-REITs sector measured by the S&P/ASX 200 A-REIT Index declined from a peak of approximately A\$148 billion (August 2007) in market capitalisation to a low of approximately A\$47 billion at the end of March 2009. The consensus is that the recent collapse exceeded the severity of the decline in A-REITs during 1989 when the sector was more conservative. The more severe collapse in the A-REITs sector has been attributed to structural alteration in recent years, including increased gearing levels. A-REITs average debt level during this period was 45%, with some trusts recording gearing levels above 60%.

Those A-REITs with higher debt levels were significantly affected and lead to the collapse and recapitalisation of several leading A-REIT's. Since the Global Financial Crisis (GFC), with low interest rates the A-REITs have performed well compared to the broader stock and bond markets with average returns of 14% (ASX 2015). This research aims to quantify the relationship overtime between different A-REITs sectors and a key capital market determinant: interest rates. The analysis is grounded on the capital asset pricing model involving the diversified, industrial, retail, office and specialised (non-core) A-REITs and macroeconomic data over 20-years (1995-2015). The 90-day bank bill and 10-year government bond yield rates are used as short-term and long-term interest rate proxies respectively.

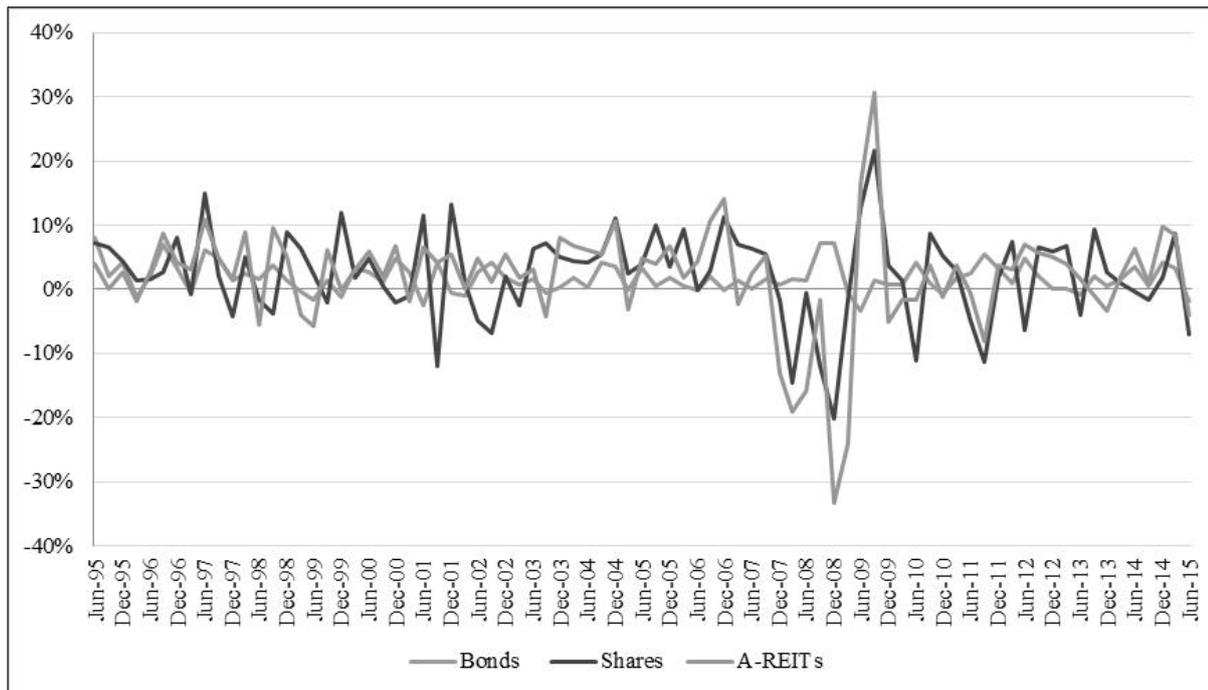
The impact of interest rate on REIT performance is discussed in the next section.

## LITERATURE REVIEW

Higgins (2007) described A-REITs as tax transparent, open-ended property investment vehicles that primarily hold, manage and maintain properties for investment. A-REITs operate in a well-established regulatory environment and are traded on the Australian Securities Exchange (ASX), providing liquidity and governance that is typically not offered in the direct property market. The A-REITs sector experienced phenomenally high total returns in the early-to-mid 2000s, averaging 20% per annum in the four years to June 2007. Figure 1 provides a comparison between the total returns for the Australian equities (Shares), A-REITs and Australian 10-year Government Bonds (Bonds) from June 1995 to June 2015.

The A-REIT sector delivered strong performance up to 2007 and was the best performing asset class for 8 of the 12 years over the period of 1996 to 2007. The performance was a mixture of active portfolio selection and trusts taking on additional risk exposure, such as increased debt/gearing levels. Eventually the collapse of stock prices, including REITs, widening credit spreads, and the freeze-up of the private equity real estate market in late 2007, resulted in a significant decline in returns. In the post-GFC period, several trusts have reduced their debt levels and are attempting to change their management structures. These changes have led the recovery of the A-REIT sector, with market capitalisation improving to approximately A\$125 billion, as at February 2016. In addition, the declining interest rate environment, coupled with strong demand for income has seen A-REIT significantly outperform the broader equities market during 2014, providing 14% return (ASX 2016; De Francesco 2007; Newell 2006; PCA 2011; Rowland 2010).

**Figure 1: Australian Equities, Bonds and A-REITs Performance: 1995 - 2015**



Source: ASX 2016; CBA 2016; RBA 2016.

Interest rate is, therefore, an important macroeconomic indicator that influences both the wider financial market and the A-REITs. Liow and Huang (2006) investigated the impact of interest rates on three major Asian listed property markets (Japan, Singapore and Hong Kong) and the UK REIT market within a time-varying risk framework. Their study found that property stocks are generally sensitive to changes in the long-term and short-term interest rates. However, Su, Huang and Pai (2010) examined the effect of change in short-term interest rates on US and Japan REITs and found that increase/ decreases in interest rates have limited effect on REIT prices. Similar studies (Laopodis 2009; Liang & Webb 1995; McCue & King 1994) on USA, Asia and UK REIT markets has demonstrated mixed results when evaluating the impact of movements in interest rates on the REIT sector's performance. In Australia, studies on the performance of REITs relative to changes in the interest rates are limited. A study by Ratcliffe and Dimowski (2007) noted that A-REITs have a significant negative relationship with long-term interest rates but an insignificant positive relationship with short-term movements in interest rates. Yong and Singh (2014) found that the negative impact of interest rate risk only affects REITs during stable and expanding market conditions.

For the A-REITs sector, the current falling interest rates mean a lower cost of debt has partially driven earnings, while making the sector look more attractive than stocks and bonds. Going forward, although rise in interest rates will increase borrowing costs, it may not mean decline in REIT returns. Yong and Singh (2014) argue that rising interest rate signals a strengthening economy. In theory, higher economic growth increases demand for commercial property, improving occupancy rates and rental income. Therefore, rental yields and inflationary expectations may offset any increase in cost of borrowings, flowing through as higher distributions to investors.

As REITs are a part of the general stock market; their expected return is subject to the same set of non-diversifiable risks born by any investment captured by market beta. Empirical evidence shows firms with higher beta, or when the stock market is more volatile, REIT volatility is also higher (Li 2012). The sensitivity of REIT returns to stock market and interest rate changes is influenced by various REIT characteristics and specialisation. Allen *et al.* (2000) explains that the relationship between risk and degree of specialization in the firm's investment portfolio may in fact depend on whether an individual REIT has sufficient expertise in the property types it holds and whether diversification across property types generates additional diversification benefits.

Ambrose and Linneman (2001) found diversified REITs had the lowest profit margin, the lowest rental income to total income, the highest average general and administration expenses and the highest market betas. In the Australian context, the evidence showed a statistically significant positive relationship between

property type and value (Hedander 2005). In addition, West and Worthington (2006) examined the impact of macroeconomic risk factors on Australian commercial real estate and found that interest rates are a significant risk factor across all types of property portfolios including property stocks. The findings from the literature appear to provide a consistent conclusion that the diversification across different property types is a naive strategy. In contrast, Ratcliffe and Dimovski (2007) found that A-REITs that diversify across different property types are able to smooth the cyclical nature of property sector returns, however findings were constrained due to the selected sample. Their study consisted of larger A-REITs with economies of scale advantage that gives them sufficient expertise to manage different property types.

The review of literature highlights that detailed analysis of the impact of movements in short-term and long-term interest rates on REIT performance over specific economic cycles are limited in both Australia and globally. This research will be the first in Australia to quantify the impact of movements in interest rates on the different A-REIT sector's performance. The research data and methodology is discussed in the next section.

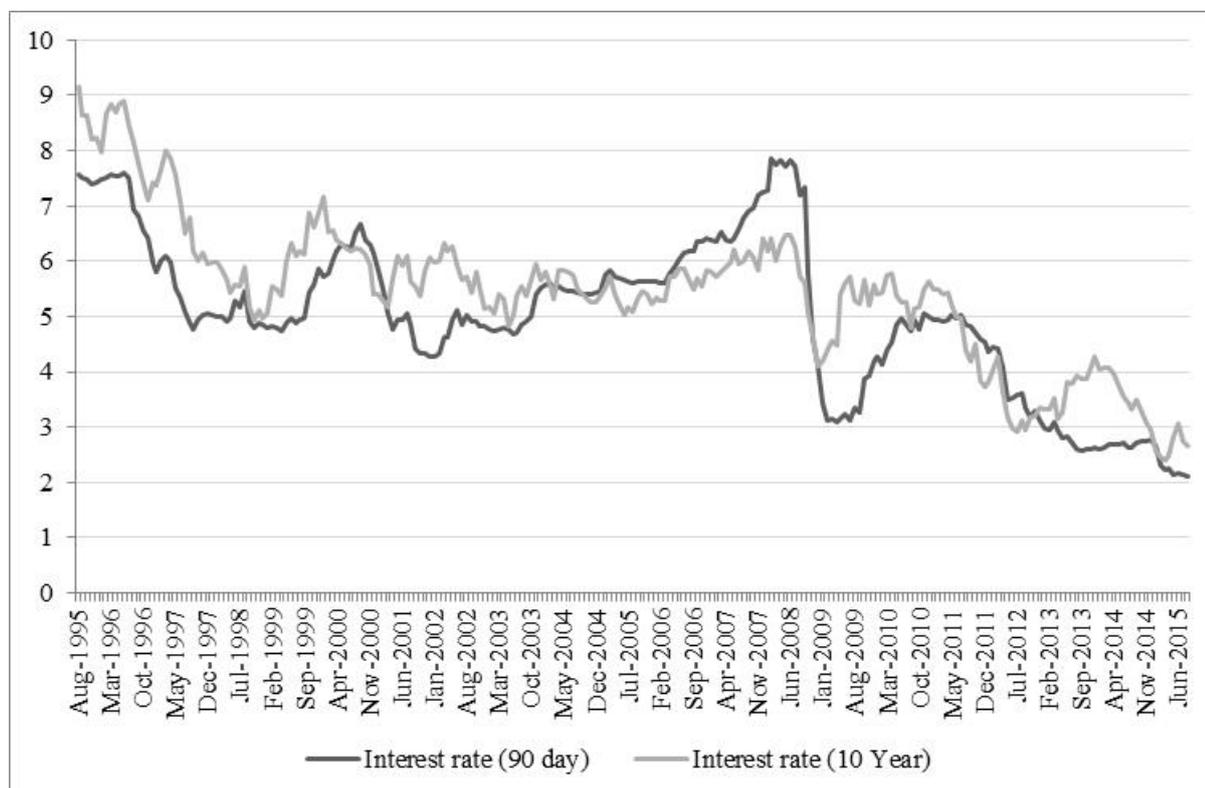
## DATA AND METHODOLOGY

### Data

This research aims to quantify the relationship overtime between interest rates and different A-REITs sectors, namely: diversified, industrial, retail, office and specialised (non-core) REITs. To do this, the analysis involves A-REITs and macroeconomic data over 20-years (1995-2015), comprising 243 monthly data points. Industry standards generally require a minimum of 60 monthly (20 quarterly) period data points for investment analysis (Bacon 2008, p. 64).

The data and benchmark representations for the research include Australian Equities - ASX All Ordinaries Accumulation; Listed Property (A-REITs) - S&P/ASX 200 A-REIT Index; Australian Fixed Income - CBA Bond: 10 year treasury bond; and, macroeconomic data: Gross Domestic Product (GDP), Inflation rates sourced from the Reserve Bank of Australia (RBA). The 90-day bank bill and 10-year government bond yield rates are used as short-term and long-term interest rate proxies respectively. Figure 2 details the Australian interest rate movements over the 1995-2015 period.

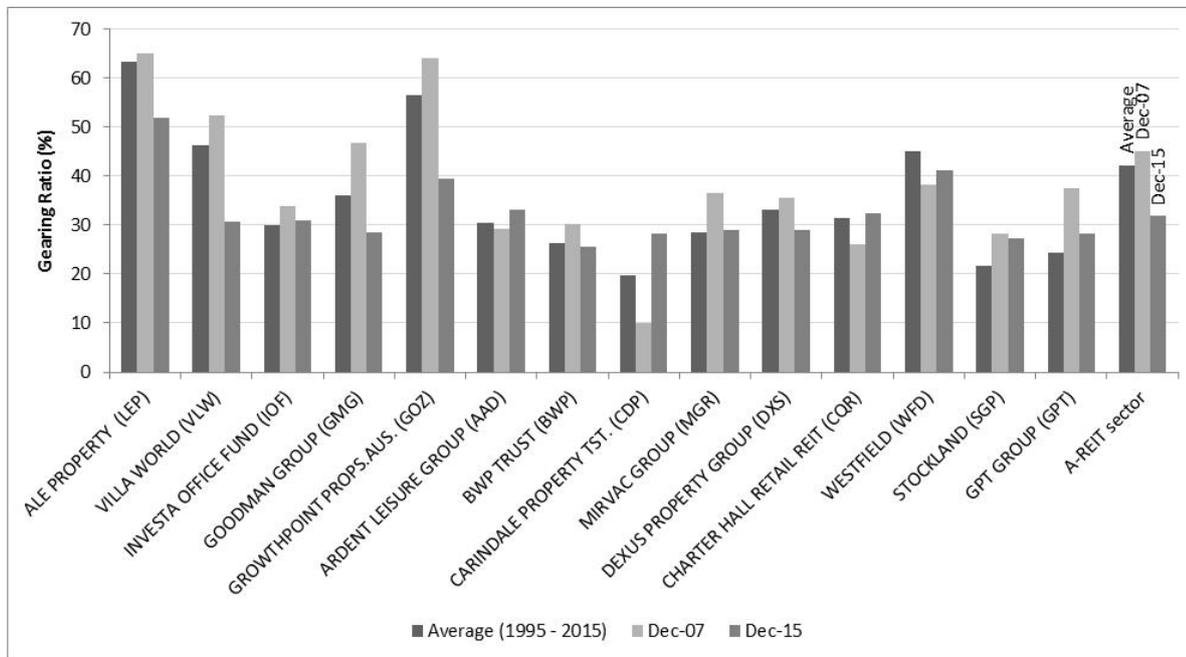
**Figure 2: Australian Interest Movements; 1995 - 2015**



Source: CBA 2016; RBA 2016.

It is evident that both the 90 day and 10 year interest rates are historical lows, providing advantageous investment environment for A-REITs. Low interest rates mean that A-REITs improve their cost of borrowing and also increase demand for, and therefore the valuation of, their properties. However, cheap debt provides added incentive for A-REITs to take on more risky investments. Any increase in short-term or long-term terms interest rate could have significant implications on fund's debt serviceability, especially A-REITs that are highly leveraged. Selected A-REITs debt-to-capital ratio, the proportion of a company's total capital that is debt, is detailed in Figure 3.

**Figure 3: A-REITs Sector and Selective Individual Fund Gearing Ratios: 1995-2015**



Source: ASX 2016

Figure 3 shows that the historical average debt-to-capital ratio (gearing) for the A-REITs sector over the 1995-2015 study period was 42%. The average gearing ratio of the A-REITs sector was around 10% in the mid-1990s, increasing to 45% by the end of 2007. In the post-GFC period, many funds have improved capital management, with the sector average gearing level reducing to 32%. Attaining a like-for-like comparison for most funds is difficult given mergers, acquisitions, re-branding and corporation spin-off activities. Looking across the 14 individual A-REITs displayed in Figure 3, except for ALE Property Group, Villa World Limited, Goodman Group, Growthpoint and Westfield Corporation, all funds have generally recorded gearing levels below the A-REITs sector averages at different time periods.

Figure 1 (page 3) highlights the historical performance of the A-REITs sector in comparison to capital market assets, equities and bonds. For A-REITs, all financial variables including: adjusted closing prices<sup>1</sup>, number of shares outstanding, debt to capital ratios, capitalisation and market price indices were collated. Returns were calculated as the natural logarithm of price ratios in sequential periods. In total, there were 55 A-REIT entities available at June 2015. To be included in the sample, REITs must satisfy size and data availability requirements. Funds with less than 24 months of available data were removed from the sample. Also, funds with less than A\$100 million in market capitalisation were not considered. Lastly, Scentre fund was recombined with Westfield<sup>2</sup>. Also Centro (CNP) was recombined with Federation<sup>3</sup>. In total, 25 funds were either removed or incorporated.

<sup>1</sup> Adjusted for dividend payments, stock splits and so forth

<sup>2</sup> Scentre group was created in June 2014 when the Westfield Group separated its United States and European businesses from its operations in Australia and New Zealand.

<sup>3</sup> Federation Centres and Novion Property Group merged in June 2015 and now trade as Vicinity Centres.

The descriptive statistics for all variables is displayed Table 1. The variable STOCK represents returns based on the ASX200 price index; BILL and BOND represent changes in short-term and long-term interest rates respectively. GDP represents the percentage change in Gross Domestic Product.

**Table 1: Descriptive Monthly Performance Statistics: June 1995 – June 2015**

	<i>A-REITs</i>	<i>STOCK</i>	<i>BOND</i>	<i>BILL</i>	<i>Inflation</i>	<i>GDP</i>
Average	-0.0004	0.0038	-0.0003	-0.0002	0.0265	0.0049
Minimum	-1.7857	-0.2528	-0.0072	-0.0157	-0.0045	-0.0056
Maximum	2.0792	0.0935	0.0092	0.0062	0.0655	0.0129
Std Dev.	0.1259	0.0404	0.0028	0.0022	0.0131	0.0032
Skewness	-0.8397	-1.5243	0.164	-2.2783	0.4381	-0.3489
Kurtosis	49.317	6.5375	0.3931	13.6771	1.0816	0.2237

Table 1 result shows that compared to the overall stock market, REITs exhibited lower returns and higher volatility over the sample period.

### **Methodology**

Previous studies evaluating the impact of movements in interest rates on the REIT sector's performance has found negative relationship with long-term interest rates but an insignificant positive relationship with short-term movements in interest rates. However, these studies such as Ratcliffe and Dimowski (2007) and Yong and Singh (2014) in Australia have used panel and panel quantile regressions methods. Similar studies overseas on Asian and UK REIT markets have used generalized autoregressive (GARCH-M) analysis (Liow & Huang 2006). This study proposes to examine the A-REIT market performance relative to the movements in interest rates using the CAPM methodology. It follows the Chen and Tzang (1998) and (Merton 1987) approach to show the sensitivity of REITs to short-term and long-term interest rates by using capital assets pricing model.

Merton's (1973) intertemporal capital asset pricing model (ICAPM) proposed that investors receive a premium for bearing market (systematic) risk as well as additional risk in the form of unfavourable shifts in the investment opportunity set, represented by a series of state variable(s). The ICAPM therefore has the following specification:

$$E(R_t) - \alpha = \beta_1[E(R_{mt}) - \alpha] + \beta_2[E(R_{ht}) - \alpha] \quad (1)$$

where

$E(R_t)$  = expected return on an asset in period  $t$

$E(R_{mt})$  = expected return on the market portfolio in period  $t$

$E(R_{ht})$  = expected return on a hedge portfolio constructed to have a covariance with each asset's return that is identical to the covariance between the changes in the state variable of interest and the asset's return

$\alpha$  = the risk free rate

To test the ICAPM, Gibbons (1980; 1982) suggested the following market model with the addition of a changing state variable:

$$R_t = \beta_0 + \beta_1 R_{mt} + \beta_2 \Delta S_t + \varepsilon_t \quad (2)$$

where  $\Delta S_t$  = changes in the state variable,  $S$  in period  $t$

The choice of an appropriate state variable therefore is an important empirical issue. Merton (1973) suggested the use of long-term interest rates, stating (p. 873):

*The interest rate has always been an important variable in portfolio theory, general capital theory, and to practitioners. It is observable, satisfies the condition of being stochastic over time, and while it is surely not the sole determinant of yields on other assets, it is an important factor. Hence, one should interpret the effects of a changing interest rate ... as a single (instrumental) variable representation of shifts in the investment opportunity set.*

Based on Merton's suggestion, we propose the following:

$$E(R_t) = \beta_0 + \beta_1 STOCK + \beta_2 BILL + \beta_3 BOND + X_t' \beta \quad (3)$$

The variable *STOCK* is computed as the monthly logarithmic returns for the ASX200 stock market index. *BILL* and *BOND* represent the changes in yields of 90-day bank accepted bills and 10 year treasury bonds respectively. The 90-day bank accepted bill and 10 year treasury bond rates are commonly accepted measures of short and long term interest rates respectively. Lastly,  $X_t$  is a vector of macroeconomic indicators including inflation and GDP growth rates. To accommodate the possibility of leading and lagging effects, leads and lags of up to two periods in the explanatory variables were tested in the preceding equation.

To examine the effect of leverage, funds were allocated into five sectors: diversified, industrial, retail, office and specialised (non-core) REITs. The results are presented in the next section.

## RESULTS

To estimate the impact of industry effects, funds were separated into five categories based on the industrial sector of closest affiliation. Table 2 outlines the number of funds and relative size by industrial sector.

**Table 2: A-REITs Size, Significance and Performance by Sector: June 1995 - 2015**

<i>Industrial sector</i>	<i>No. Funds</i>	<i>Market Cap. (A\$m)</i>	<i>Relative Size (%)</i>	<i>Average Gearing (%)</i>
Diversified	11	37,770.54	40	40
Retail	6	36,855.00	39	33
Industrial	2	11,174.41	12	47
Specialised	9	4,473.96	5	41
Office	2	4,159.78	4	36

There were 11 funds in the sample operating in the diversified sector accounting for approximately 40% of the market. The second largest sector by size was the retail sector with 6 funds accounting for approximately 39% of the market. Industrial sector REITs accounted for 12% of market size, followed by specialised (non-core) 5% and office 4%. The sample included 2 office, 2 industrial and 9 specialised REITs. The results show varying debt-to-capital ratios across the five sectors. Industrial REIT exhibits high average gearing ratio (47%), whilst retail REITs recorded the lowest average gearing level (33%). Except for industrial REITs, all other sectors recorded gearing levels below the 20-year A-REIT average (42%), including specialised (41%), diversified (40%) and office (36%). Table 3 detailed the individual A-REIT debt-to-capital ratios across the five sectors.

**Table 3: Individual A-REITs Average Gearing Ratio (%): June 1995 - 2015**

<b>Diversified</b>	<b>Gearing</b>	<b>Specialised</b>	<b>Gearing</b>	<b>Retail</b>	<b>Gearing</b>
BROOKFIELD PRIME	67%	ALE PROP. GROUP	63%	WESTFIELD	45%
GALILEO JAPAN	67%	GENERATION HLTHC.	56%	SCENTRE GROUP	44%
ASTRO JAPAN	58%	INGENIA COMMUNT.	55%	SHOP. CENTS.AUS. GP.	34%
GROWTHPOINT	57%	VILLA WORLD	46%	CHARTER HALL RETAIL	32%
360 CAPITAL GROUP	39%	FOLKESTONE ED.	45%	BWP TRUST	26%
ABACUS PROP. GROUP	33%	ASPEN GROUP	35%	CARINDALE PROP. TRUST.	20%
DEXUS PROP. GROUP	33%	ARDENT LEISURE	30%	<b>Industrial</b>	<b>Gearing</b>
MIRVAC GROUP	28%	ARENA REIT	29%	360 CAPITAL INDL.FUND	58%
GPT GROUP	24%	US MASTERS RESD.	13%	GOODMAN GROUP	36%
STOCKLAND	22%			<b>Office</b>	<b>Gearing</b>
CHARTER HALL GR.	14%			CROMWELL PROP. GROUP	41%
				INVESTA OFFICE FUND	30%

Table 3 highlights that 12 out of the 30 REITs, approximately 40%, having gearing levels above the 20-year historical average (42%). Looking across the different sectors, 8 funds recorded gearing levels above 50%, including 4 in diversified sector, 1 in the respective specialised and industrial sectors. Gearing ratios for diversified sector ranged from 14-67%, specialised sector 13-63%, retail sector 20-45%, industrial sector 36-58% and office sector 30-41%. The Brookfield Prime Property Fund (BPA) and Galileo Japan Trust (GJT), both from diversified sector, recorded the highest debt-to-capital ratios (67%). It appears that diversified A-REITs rely more on debt funding than single-sector funds. The results also show greater debt reliance by non-core property funds that specialise in healthcare, child-care and retirement facilities.

Table 4 illustrates the historical monthly total return performance data for different A-REIT sectors. The Sharpe ratio is calculated using the 90 day Treasury bill as the risk-free rate. The results show that industrial sector funds recorded the best risk-adjusted return performance (0.09), followed by the retail (0.04) and office sectors (0.02). The industrial sector displayed high returns and volatility over the 20-year study period.

**Table 4: A-REITs Performance Statistics by Sector: June 1995 - 2015**

<b>Industrial sector</b>	<b>Diversified</b>	<b>Specialised</b>	<b>Retail</b>	<b>Industrial</b>	<b>Office</b>
Average Returns (%)	-0.13%	-0.90%	0.26%	1.98%	0.28%
Std. Dev. (%)	5.96%	14.59%	6.87%	21.14%	15.68%
Sharpe Ratio	-0.02	-0.06	0.04	0.09	0.02

The key parameters from past market data, risk, return and correlation measures, provide the platform to quantify the relationship overtime between interest rates and different A-REITs sectors using the CAPM methodology. The A-REITs returns series show strong statistically significant correlation to market returns

(STOCK), one period ahead inflation and short-term interest rates (BILL). However, A-REIT returns were not significantly correlated to GDP growth. Although average returns for the REIT sector as a whole were significantly correlated to long term interest rates (BOND), average returns for individual A-REIT sectors were not. Economic theory states that GDP and Inflation are themselves related. The rationale for including these indicators is to control for general macroeconomic conditions therefore including both in the model may result in over-fitting of the data given the systematic relationship between them. The variable GDP was thus removed from the model. The results from the regression analysis are summarised in Table 5.

**Table 5: Relationship between Interest Rates and A-REITs Performance: By Sector**

	<i>Diversified</i>	<i>Industrial</i>	<i>Specialised</i>	<i>Retail</i>	<i>Office</i>
<i>Constant</i>	0.007	0.041	0.024	0.013	-0.009
<i>ASX 200 Returns</i>	0.909***	1.531***	0.704***	0.864***	0.143
<i>Inflation</i>	-0.003	-0.008	-0.014*	-0.003	0.004
<i>Interest rate (90 day)</i>	6.963***	6.123	5.899	2.892	7.893
<i>Interest rate (10 year)</i>	-4.421***	0.009	4.353	-3.453**	6.303
<i>Adjusted R<sup>2</sup></i>	0.480	0.100	0.072	0.293	0.022

Results are based on estimations of Equation (3). \*, \*\* and \*\*\* denotes statistical significance at the 10%, 5% and 1% levels of significance respectively.

Fund performance in the diversified and retail sectors was well explained by the asset pricing model whereas fund performance in the remaining industrial, specialised (non-core) and office sectors was not explained. This may in part be due to a general lack of observations and relatively small size of funds in the remaining sectors. Both the diversified and retail sector exhibited strong exposure to market risk, short-term and long-term interest rates. Overall, rising short-term interest rates contributed to positive returns while rising long-term interest rates resulted in lower returns. The results are consistent with earlier studies (Ratcliffe and Dimowski 2007) which found that A-REITs have a significant negative relationship with long-term interest rates but a positive relationship with short-term movements in interest rates.

## CONCLUSION

This research examined the relationship overtime between interest rates and different A-REITs sectors, namely: diversified, industrial, retail, office and specialised (non-core) REITs. The analysis was conducted using A-REITs and macroeconomic data over 20-years (1995-2015), with the capital asset pricing model used to test the significance of interest rate on A-REITs performance. The 90-day bank bill and 10-year government bond yield rates were used as short-term and long-term interest rate proxies respectively.

In total, 30 A-REITs was used for the study. To be included in the sample, REITs had to satisfy size and data availability requirements. Funds with less than 24 months of available data were removed from the sample. Also, funds with less than A\$100m in market capitalisation were not considered. There were 11 diversified funds, accounting for approximately 40% of the market. The second largest sector by size was the retail sector with 6 funds (39%), followed by industrial funds (12%), specialised (non-core) 5% and office 4% market size. The results show varying debt-to-capital ratios across the five sectors. Gearing ratios for diversified sector ranged from 14-67%, specialised sector 13-63%, retail sector 20-45%, industrial sector 36-58% and office sector 30-41%. It appears that diversified A-REITs rely more on debt funding than single-sector funds. Overall, at a sectoral level, excluding industrial REITs, all other sectors recorded gearing levels below the 20-year A-REIT average (42%). However, industrial sector funds did out-performed the others sectors with the highest risk-adjusted return performance (0.09).

The CAPM modelling results show that both the diversified and retail sector exhibited strong exposure to market risk and short and long term interest rates. Rising short-term interest rates contributed to positive returns while rising long-term interest rates resulted in lower returns. However, the impacts of movements in interest rates on industrial, specialised (non-core) and office sectors were not well explained by the asset pricing model. This could be due to the relatively small size of these funds. Overall, the results suggest that gearing levels and by extension costs of debt, do play a significant role in the returns generating process. Highly leveraged funds performed better under rising short-term interest rates compared to those with lower leverage, which may be a result of improved rental yields associated with periods of economic growth.

Going forward, this research has wider industry significance. Although, Australia's interest rates are currently at record low levels, the rates are expected to move back up as the economy recovers. This is similar to the current economic cycle faced by the US REITs market. The current signs in USA are of strong macroeconomic recovery – increased employment, consumer spending, which has also increased the demand for commercial properties. Therefore, quantifying the different A-REIT sector's performance patterns would broaden investors' understanding in financial asset pricing and implications of any future movements in interest rates in Australia.

## REFERENCE

- Allen, MT, Madura, J & Springer, TM 2000, 'REIT characteristics and the sensitivity of REIT returns', *The Journal of Real Estate Finance and Economics*, vol. 21, no. 2, pp. 141-152.
- Ambrose, B & Linneman, P 2001, 'REIT organizational structure and operating characteristics', *Journal of Real Estate Research*, vol. 21, no. 3, pp. 141-162.
- Australian Securities Exchange 2016, *Managed funds*, ASX, viewed 22 February 2016 <<http://www.asx.com.au/products/managed-funds.htm>>.
- Bacon, C 2008, *Practical portfolio performance measurement and attribution*, 2nd edn, John Wiley & Sons Ltd Inc, England.
- Commonwealth Bank of Australia 2016, *CBA Bond: All Series, All Maturities indices*, CBA, Sydney.
- Chen, K & Tzang, D 1988, 'Interest-rate sensitivity of real estate investment trusts', *Journal of Real Estate Research*, vol. 3, no. 3, pp. 13-22.
- De Francesco, A 2007, 'Gearing and the Australian real estate investment market', *Journal of Property Investment and Finance*, vol. 25, no. 6, pp. 579-602.
- Gibbons, MR 1982, 'Multivariate tests of financial models: A new approach', *Journal of Financial Economics*, vol. 10, no. 1, pp. 3-27.
- Gibbons, MR 1980, *Econometric methods for testing a class of financial models: An application of the Nonlinear Multivariate Regression Model*, University of Chicago, ProQuest Dissertations Publishing.
- Hedander, J 2005, 'Focus, liquidity and firm value: An empirical study of listed property trusts in Australia', *Pacific Rim Property Research Journal*, vol. 11, no. 1, pp. 84-111.
- Higgins, D 2007, 'Placing commercial property in the Australian capital markets', *RICS Research Paper Series*, vol. 7, no. 12, London.
- Laopodis, N 2009, 'REITs, the stock market and economic activity', *Journal of Property Investment & Finance*, vol. 27, no. 6, pp. 563-578.
- Li, L 2012, 'The Determinants of REIT Volatility', working paper, Citeseer, viewed 22 February 2016 <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.299.4863&rep=rep1&type=pdf>>.
- Liang, Y & Webb, J 1995, 'Pricing interest-rate risk for Mortgage REITs', *Journal of Real Estate Research*, vol. 10, no. 4, pp. 461-469.
- Liow, KH & Huang Q 2006, 'Interest rate risk and time-varying excess returns for Asian property stocks', *Journal of Property Investment & Finance*, vol. 24, no. 3, pp. 188-210.
- Merton, RC 1987, 'A simple model of Capital Market Equilibrium with incomplete information', *The Journal of Finance*, vol. 42, no. 3, pp. 483-510.

- Merton, RC 1973, 'An intertemporal capital asset pricing model' *Econometrica*, vol. 41, no. 5, pp. 867-887.
- McCue, T & Kling, J 1994, 'Real estate returns and the macroeconomy: Some empirical evidence from real estate investment trust data, 1972-1991', *Journal of Real Estate Research*, vol. 9, no. 3, pp. 277-287.
- Newell, G 2006, 'The changing risk profile of listed property trusts', *Australian Property Journal*, vol. 39, no. 3, pp. 172-180.
- Property Council of Australia, 2011, *Australian property investment industry: Autumn 2011*, PCA, Sydney.
- Reserve Bank of Australia 2016, *Financial and economic statistics (data files)*, RBA, Sydney, viewed 30 January 2016, < <http://www.rba.gov.au/statistics/tables/>>.
- Ratcliffe, C & Dimovski, W 2007, 'The responsiveness of LPT returns and their attributes', *Pacific Rim Property Research Journal*, vol. 13, no. 3, pp. 280-297.
- Rowland, PJ 2010, *Australian property investments and financing*, Thomson Reuters (Professional Australia) Limited, NSW.
- Su, H, Huang, C, & Pai, Y 2010, 'The hybrid characteristic of REIT returns: evidence from Japanese and U.S. markets', *Journal of Real Estate Literature*, vol. 18, no. 1, pp. 77-98.
- Yong, J & Singh, A 2014, 'Interest rate risk of Australian REITs: a panel analysis', *Proceedings of the 20th Pacific Rim Real Estate Society Conference*, 19-22 January 2014, Christchurch, New Zealand.
- West, T & Worthington, AC 2006, 'Macroeconomic risk factors in Australian commercial real estate, listed property trust and property sector stock returns', *Journal of Financial Management of Property and Construction*, vol. 11, no. 2, pp. 105-116.

## **Acknowledgment**

The authors would like to acknowledge the contribution of Mr Mario Saccoccio, Melbourne based property professional, for his ongoing industry involvement with the research. In addition, we acknowledge contributions made by research supervisor, Associate Professor Dr David Higgins and research partner Dr Eric Too.

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