

IMPACT OF INTEREST RATE MOVEMENTS ON A-REITS PERFORMANCE BEFORE, DURING AND AFTER THE GLOBAL FINANCIAL CRISES

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ABSTRACT

The Global Financial Crisis (GFC) created a decline in financial market conditions which impacted A-REITs with a fall of 70% in 2009. 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 GFC, with low interest rates the A-REITs have performed well compared to the broader stock and bond markets. The research investigates the impact of leverage and interest rate movements on A-REITs performance during difference market conditions using the capital asset pricing model. Three distinct segments of the economic cycle were observed over the sample period. This included: pre-GFC (prior to September 2007), GFC (September 2007 – August 2009) and post-GFC (after August 2009). 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 in terms of the asset pricing tests, funds prior to the GFC did not exhibit much sensitivity to changes in interest rates. Changes in long term interest rates had a significantly negative impact on fund returns in low debt and high debt A-REIT portfolios. The results also show that during the GFC, market risk increased sharply both in magnitude and significance. In the post GFC recovery phase, market risk diminished in magnitude but inflation featured more prominently. Interest rates became a less significant driver of fund returns possibly due to already low levels of interest creating an environment of cheap credit. Similar patterns were observed in size-sorted portfolios. Overall, in the years prior to the GFC, medium and large firms exhibited a negative relationship with long term interest rates. During the GFC, market risk became a much stronger driver of fund returns. Market risk became less prominent in the years after the GFC with long term interest rates being significant in large firms only.

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

INTRODUCTION

The A\$142 billion Australian real estate investment trusts (A-REITs) are popular investment options for both institutional and retail investors seeking regular income and capital growth. A-REITs were formally known as Listed Property Trusts (LPTs) that have a long established history in the Australian stock market since 1971. 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 (Higgins 2010; Rowland 2010).

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 (ASX 2016). The consensus is that 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 2016).

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Ratcliffe and Dimovski (2007) explain that the degree of financial leverage has brought forward the attention to interest rate which is an important macroeconomic indicator that influences both the wider financial market and the A-REITs. Liang and Webb (1995) conclude that a large part of market risks for REITs are driven by interest rate uncertainties due to their asset portfolios. Further, Swanson *et al.* (2002) found that interest rates have a greater impact on REITs than ordinary share corporations and thus may exert an investment advantage or disadvantage given the state of interest rates in the United States of America (US). Thus, interest rates along with beta factor of individual firms consistently drive REIT stock price and returns (Chen & Tzang 1988).

Many of these overseas studies include periods of economic expansion, recession and recovery, thereby encompassing significant economic swings and changes in trading volume. With respect to interest rates, the extant research pertinent to A-REITs is limited in Australia. Newell (2005) investigated the Australian listed property funds at both the sector and individual asset level to assess the proportion of A-REITs return variability that is attributed to stock market movements, interest rates and direct property factors. Consistent with this previous research, Ratcliffe and Dimovski (2007) also found conclusive evidence that the long-term interest rate coefficient returned the hypothesised negative and significant result. However, their findings revealed an insignificant positive relationship with short dated interest securities which aligned with the findings from Allen *et al.* (2000). The findings of Yong and Singh (2015) revealed that the sensitivities to interest rates vary during upward and downward market conditions whereas the impact of long-term financing costs undermining A-REIT returns is evident only during robust market conditions.

This research investigates the impact of leverage and interest rate movements on A-REITs performance during different market conditions (pre-GFC, GFC and post-GFC) using the capital asset pricing model. The literature on impact of interest rate on REIT performance is discussed in the next section.

LITERATURE REVIEW

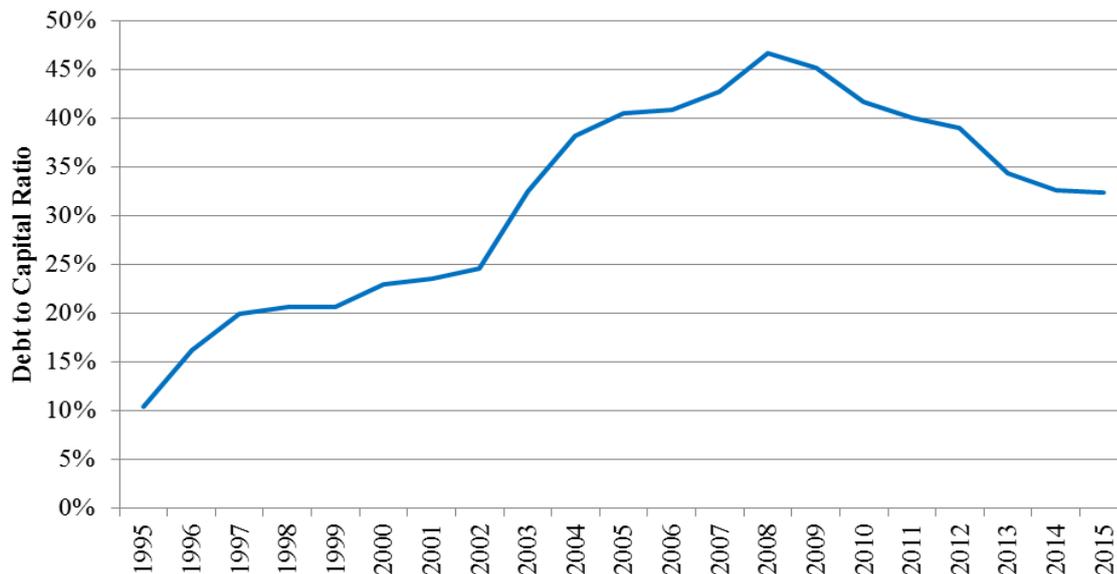
As per the Capital Asset Pricing Model (CAPM), total expected stock return or equity cost of capital break down into components relating to systematic market risk (beta) and unsystematic specific risk (business/real estate sector). As REITs are a part of the general stock market; their expected return 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. Allen *et al.* (2000) analysed how sensitivity to stock-market and interest-rate changes may vary across REITs as a function of their asset structure, financial leverage, management strategy, and/or the degree of specialization in their investment portfolios. According to Delcours and Dickens (2004), the investigation of the determinants of systematic risk sensitivity include long-term financing, short-term financing and variable rate-financing, business risk, marketability and agency cost. Li (2012) relates change in REIT stock volatility to a variety of time varying economic and market variables: market risk, firm level economic activities, financial leverage, inflation shocks and trading activities.

The Modigliani-Miller (M&M) theorem depicted that in a tax-free environment all firms should be all equity-financed. However, REITs have been found to be historically highly leveraged despite having no tax shield due to its tax-exempt status. Their motivation of debt financing is to increase investment opportunities which require large capital outlays. From M&M, equity REIT volatility can be expressed as a combination of debt price volatility, and volatility of the firm's total value. This establishes a direct link between financial leverage and firm's equity return volatility.

Financial leverage can magnify the firms' investment returns when the return on the portfolio is adequately positive. However, leverage can also magnify a negative return on an investment portfolio, creating more pronounced losses. Therefore, the risk of a REIT is expected to be positively related to its degree of financial leverage (Allen et al. 2000; Li 2012; Lin Lee et al. 2008; Ratcliffe & Dimovski 2007). Further, De Francesco (2007) highlighted that risk rises with rising gearing levels and that risk-adjusted returns fall with rising gearing. Furthermore, the gearing-risk relationship is influenced by not only the cost of debt structure but also the interdependency between ungeared returns and interest rates. The following Figure 1 shows the leverage ratio for A-REITs over the period of 1995 to 2015.

Figure 1: Average Leverage Ratio for A-REITs: 1995 - 2015



Source: ASX 2016

Figure 1 depicts a steady increase in the leverage ratio from 1995 through to the onset of the GFC. Newell (2006) argued that this steady increase was due to a low interest rate environment and increased exposure to international properties. However, in comparison to US REITs and the overall share market, the leverage levels for A-REITs are relatively low. Whereas, Ratcliffe and Dimovski (2007) found that structural changes, such as increased merger activity, a wider range of property asset classes and a rise in the number of internally managed entities, have contributed to the increased levels of leverage. In the post GFC, the majority of A-REITs decreased their debt levels through recapitalisation and balance sheet restructuring (Newell & Peng 2009).

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.

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 A-REIT performance over different time periods: pre-GFC, GFC and post GFC. The research data and methodology is discussed in the next section.

DATA AND METHODOLOGY

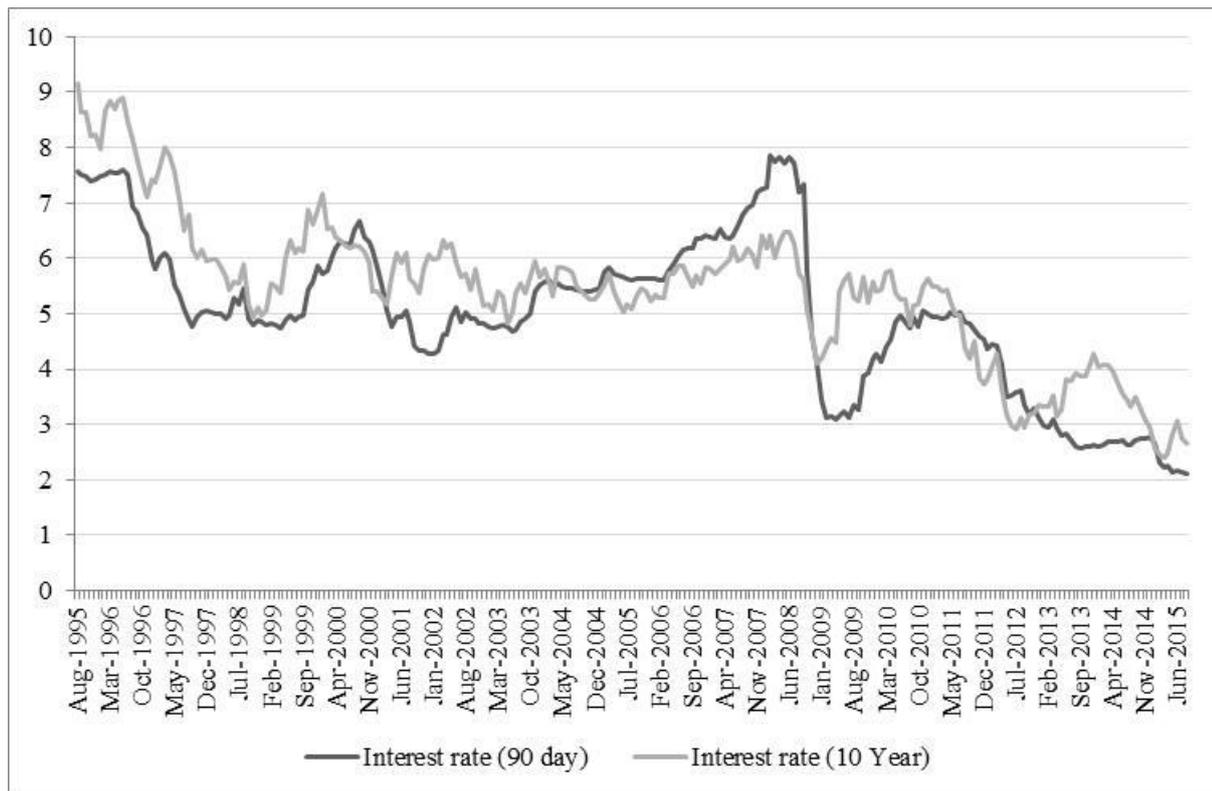
Data

This research aims to quantify the relationship overtime between interest rates and different A-REITs. Three distinct segments of the economic cycle were observed over the sample period. This included: pre-GFC (prior to September 2007), GFC (September 2007 – August 2009) and post GFC (after August 2009). To do this, the analysis involves A-REITs and macroeconomic data over 20-years (1995-2015), comprising 243 monthly data points.

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. 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%.

For A-REITs, all financial variables including: adjusted closing prices², 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 Westfield³. Also Centro (CNP) was recombined with Federation⁴. In total, 25 funds were either removed or incorporated.

² Adjusted for dividend payments, stock splits and so forth

³ 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.

⁴ 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 Performance Statistics (annualised): June 1995 – June 2015

	<i>A-REITs</i>	<i>STOCK</i>	<i>BILL</i>	<i>BOND</i>	<i>Inflation</i>	<i>GDP</i>
Mean	5.66%	5.31%	5.01%	5.43%	2.65%	3.50%
Median	9.53%	7.23%	4.98%	5.52%	2.60%	3.90%
Std Dev.	18.95%	15.11%	1.41%	1.32%	1.20%	1.82%
Minimum	-62.84%	-47.13%	2.12%	2.41%	0.30%	0.15%
Maximum	39.65%	36.89%	7.86%	8.90%	4.70%	6.58%

Table 1 result shows that compared to the overall stock market, REITs exhibited lower returns and higher volatility over the sample period. A-REITs slightly outperformed equities but with higher standard deviation. However, A-REITs lower mean than median indicates negative skewness and clusters of poor performance. As expected, the BOND returns are higher than BILL yields with lower standard deviation.

Methodology

Previous studies evaluating the impact of movements in interest rates on the REIT 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

α = 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 ΔS_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:

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

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. The results are presented in the next section.

RESULTS

To examine the effect of leverage on A-REITs performance, three distinct segments of the economic cycle were observed over the sample period. This included: pre-GFC (prior to September 2007), GFC (September 2007 – August 2009) and post GFC (after August 2009). The years prior to the GFC were characterised by strong economic growth and relative prosperity. This was punctuated by several spikes in inflation and overall high interest rates. In contrast, the onset of the GFC saw falling economic growth, rising volatility in inflation and sharp reductions in interest rates. As the economy entered its recovery phase post GFC, there was a partial restoration of GDP growth and further reductions in interest rates. Table 2 compares the performance of A-REITs and Australian Equities over different time periods.

Table 2: Descriptive Performance Statistics (annualised): June 1995 – June 2015

	<i>Pre-GFC</i>		<i>GFC</i>		<i>Post-GFC</i>	
	<i>A-REITs</i>	<i>STOCK</i>	<i>A-REITs</i>	<i>STOCK</i>	<i>A-REITs</i>	<i>STOCK</i>
Mean	11.89%	9.11%	-34.00%	-18.23%	7.38%	6.13%
Std Dev.	9.24%	10.15%	23.26%	22.67%	14.55%	12.64%
Sharpe Ratio	1.11	0.85	-2.82	-1.26	0.14	0.08
No obs.	144	144	24	24	72	72
Minimum	-10.23%	-18.91%	-62.84%	-47.13%	-35.09%	-15.49%
Maximum	39.65%	31.03%	15.80%	27.68%	36.84%	36.89%

Table 2 result shows that compared to the overall stock market, A-REITs exhibited higher returns and lower standard deviation over the pre-GFC. Both A-REITs and Australian equities recorded their best Sharpe ratio during the pre-GFC period, 1.11 and 0.85 respectively. This period of the market was characterised by phenomenally high total returns in the A-REITs sector, evident by the highest maximum return (40%). This attracted significant institutional money, in what is now termed as the 'A-REITs Golden Era'. The A-REIT's higher return performance was a mixture of active portfolio selection and trusts taking on additional risk exposure, such as increased debt/gearing levels. The gearing level in the A-REITs sector increased strongly from 1994, from 10% to above 45% at the height of the GFC (see Figure 1). This strategy proved unsustainable. 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.

Although during the GFC, both A-REITs and the general equities market recorded high negative returns, the effect of the GFC was more prominent in the A-REITs sector. A-REITs returns were -34%, which equates to 47% lower than the Australian equities returns during GFC (-18%). Predictably, both A-REITs and Australian equities recorded high standard deviations (23%) during the GFC. This also translated in the lowest Sharpe ratio over the total study period, -2.82 for A-REITs and -1.26 for Australian equities. The minimum returns for A-REITs fall to -63%. The post-GFC period has seen strong recovery in both the A-REITs and Australian equities markets. During this period, A-REITs exhibited higher returns than equities, albeit a slightly high standard deviation to record high Sharpe ratio (0.14) compared to equities (0.08). This

stronger recovery in the A-REITs sector can be attributed to several trusts having reduced their debt levels (see Figure 1) and attempts to change their management structures, such as reverting to external management and separating their investment trust units from their stapled company shares.

To estimate the impact of leverage, funds were allocated into two portfolios: Low Debt (LD) and High Debt (HD); based on gearing levels. A fund was considered to be Low Debt if its debt to capital ratio was lower than the cross sectional average in the prevailing period and High Debt otherwise. In addition, funds were also separated into two portfolios: stapled and unit based on their management structure as reported on the ASX website. Note that stapled funds are internally managed and unit funds are externally managed. The results from the cross sectional asset pricing tests over pre-GFC, GFC and post GFC periods are summarised in Tables 3 and 4.

Table 3: Relationship between Interest Rates and A-REITs Performance at Different Intervals: By Gearing Level and Fund Type (June 1995 – June 2015)

		<i>ALL Funds</i>	<i>LD</i>	<i>HD</i>	<i>Stapled</i>	<i>Unit</i>
<i>Pre-GFC</i>	<i>Constant</i>	0.0112	0.0118	0.0114**	0.0115	0.0100**
	<i>STOCK</i>	0.3171***	0.4664***	0.2794***	0.3394***	0.1710**
	<i>Inflation</i>	-0.1757	-0.4611*	-0.1824	-0.1728	-0.1805
	<i>BILL</i>	-1.2473	1.9382	-0.3367	-0.8079	-2.5171
	<i>BOND</i>	1.9364	-2.8494*	-2.4779**	2.2556	-1.4329
	<i>Adjusted R²</i>	0.046	0.128	0.123	0.050	0.090
<i>GFC</i>	<i>Constant</i>	0.0048	-0.0274	0.0118	-0.0075	0.0366
	<i>STOCK</i>	1.4767***	1.6966***	1.3329***	1.5522***	1.2826***
	<i>Inflation</i>	-1.1995	0.3087	-1.5864	-0.9768	-1.7723
	<i>BILL</i>	4.2189	2.0568	6.7428	3.2427	6.7289
	<i>BOND</i>	-3.4896	0.2118	-5.4408	-3.2588	-4.0830
	<i>Adjusted R²</i>	0.771	0.706	0.675	0.759	0.705
<i>Post-GFC</i>	<i>Constant</i>	0.0359**	0.0233	0.0418***	0.0368**	0.0305*
	<i>STOCK</i>	0.5975***	0.7852***	0.3076***	0.7007***	0.3774***
	<i>Inflation</i>	-1.2713**	-0.8652	-1.3962**	-1.3673**	-0.9428
	<i>BILL</i>	-1.9656	-2.1042	-0.9103	-0.9517	-3.9900
	<i>BOND</i>	-1.0626	-3.2134*	1.5134	-2.4301	1.8289
	<i>Adjusted R²</i>	0.463	0.517	0.235	0.453	0.252

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

In terms of the asset pricing tests, funds prior to the GFC did not exhibit much sensitivity to changes in interest rates. Changes in long term interest rates had a significantly negative impact on fund returns in LD and HD portfolios. During the GFC, market risk increased sharply both in magnitude and significance. No other variables in the dataset had a significant effect on fund returns. In the post GFC recovery phase, market risk diminished in magnitude but inflation featured more prominently. Interest rates became a less significant driver of fund returns possibly due to already low levels of interest creating an environment of cheap credit. Externally managed A-REITs were more sensitive to changes in long term interest rates than stapled REITs. However, stapled REITs have greater exposure to market risk. Some stapled A-REITs also engage in property development, which compound the impact of financial risk.

Table 4 further displays the relationship between interest rates and A-REITs performance based on fund size. Smaller funds (with less market capitalisation) may be considered riskier than larger (presumably better established) funds. Funds were allocated into three portfolios: small, medium and large based on market capitalisation. Small funds have less than A\$1 billion in market value at June 2015 (14 funds). Medium

funds have between A\$1-3 billion in market value (9 funds) and Large funds have greater than A\$3 billion in market capitalisation value (7 funds) at June 2015.

Table 4: Relationship between Interest Rates and A-REITs Performance at Different Intervals: By Fund Size (June 1995 – June 2015)

		<i>ALL Funds</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>
<i>Pre-GFC</i>	<i>Constant</i>	0.0112	0.013	0.000	0.008
	<i>STOCK</i>	0.3171***	0.181	0.414***	0.581***
	<i>Inflation</i>	-0.1757	-0.004	0.002	0.000
	<i>BILL</i>	-1.2473	-2.044	0.494	-1.685
	<i>BOND</i>	1.9364	4.477**	-4.869***	-3.161***
	<i>Adjusted R²</i>	0.046	0.027	0.248	0.338
<i>GFC</i>	<i>Constant</i>	0.0048	0.013	-0.088	-0.008
	<i>STOCK</i>	1.4767***	1.378***	2.029***	1.210***
	<i>Inflation</i>	-1.1995	-0.012	0.039	0.003
	<i>BILL</i>	4.2189	5.798	6.610	1.722
	<i>BOND</i>	-3.4896	-4.208	-5.382	-2.193
	<i>Adjusted R²</i>	0.771	0.690	0.695	0.544
<i>Post GFC</i>	<i>Constant</i>	0.0359**	0.059***	0.057	0.012
	<i>STOCK</i>	0.5975***	0.476***	0.338	0.787***
	<i>Inflation</i>	-1.2713**	-0.019***	-0.018	-0.004
	<i>BILL</i>	-1.9656	-3.940	-3.455	-1.207
	<i>BOND</i>	-1.0626	1.428	-2.745	-5.787***
	<i>Adjusted R²</i>	0.463	0.405	0.003	0.608

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

Similar patterns were observed in size-sorted portfolios. In the years prior to the GFC, medium and large firms exhibited a negative relationship with long term interest rates. During the GFC, market risk became a much stronger driver of fund returns. Market risk became less prominent in the years after the GFC with long term interest rates being significant in large firms only.

CONCLUSION

This research examined the relationship overtime between interest rates and different A-REITs performance. Three distinct segments of the economic cycle were observed over the 20-years sample period (1995-2015): pre-GFC (prior to September 2007), GFC (September 2007 – August 2009) and post GFC (after August 2009). The analysis was conducted using A-REITs and macroeconomic data, 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.

The performance matrix shows that compared to the overall stock market, A-REITs exhibited lower returns and higher volatility over the 20-year sample period. However, when the performance data is split across three economic cycles, A-REITs mainly recorded better risk-adjusted returns than equities. A-REITs slightly outperformed Australian equities during the pre-GFC and post-GFC periods with higher Sharpe ratio (albeit slightly higher standard deviation during post-GFC). A-REITs recorded its highest return during the pre-GFC period (40%). In early 2000's, A-REITs gearing levels were approximately 20-25% of total assets.

From 2004, this increased to approximately 35-45% of total assets. Highly leveraged funds suffered heavy losses during the GFC period. Consequently, the sector recorded its worst performance during GFC, with record low Sharpe ratio (-2.82%). Much of the under-performance during this period could be attributed to aggressive borrowing for expansion. Post GFC, many A-REITs have recovered due to balance sheet restructuring, reduction of debt, capital raisings and general recovery of the equity market. Overall reduction in leverage means A-REIT gearing levels has reduced to below 35% currently. As a result, A-REITs exhibited higher returns than equities in the post-GFC period to record high Sharpe ratio (0.14) compared to equities (0.08).

To estimate the impact of leverage, funds were allocated into different portfolios: low debt and high debt based on gearing levels, and fund type (stapled and externally managed). The empirical results from asset pricing tests found that funds prior to the GFC did not exhibit much sensitivity to changes in interest rates. Changes in long term interest rates had a significantly negative impact on fund returns in low debt and high debt A-REIT portfolios. In addition, the results show that during the GFC, market risk increased sharply both in magnitude and significance. In the post GFC recovery phase, market risk diminished in magnitude but inflation featured more prominently. Interest rates became a less significant driver of fund returns possibly due to already low levels of interest creating an environment of cheap credit. Externally managed A-REITs were more sensitive to changes in long term interest rates than stapled REITs. The analysis was also conducted based on fund size: small funds (less than A\$1 billion), medium funds (A\$1-3 billion) and large funds (greater than A\$3 billion) in market capitalisation value. Overall, similar patterns were observed in size-sorted portfolios. The results show that in the years prior to the GFC, medium and large firms exhibited a negative relationship with long term interest rates. However, during the GFC, market risk became a much stronger driver of fund returns. Market risk became less prominent in the years after the GFC with long term interest rates being significant in large firms only.

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. Therefore, quantifying the different A-REIT sector's performance over different economic cycles would broaden investors' understanding in financial asset pricing and implications of any future movements in interest rates in Australia. Investors and portfolio managers seeking to reduce exposure to interest rate risk inherent to property investments can do so by selecting A-REITs funds that have less leverage and are internally managed. However, these funds have greater exposure to market risk.

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