The macroeconomic forces that drive REIT returns in Australia

Woon Weng Wong School of Property Construction and Project Management (PCPM), RMIT University, Australia

Abstract: Real Estate Investment Trusts (REITs) represent a viable alternative to direct property investments. They offer enhanced liquidity and risk diversification. In addition, the securitisation process provides a level of governance not typically offered in direct property markets. However, as an openly traded security, it experiences risk exposures inherent to equities such as interest rate risk, default risk, inflation and so on. This study explores the nature and magnitude of various macroeconomic risk factors that drive REIT performance.

Utilising data from the Australian market over a 20 year period spanning multiple economic cycles, REITs were found to have an adverse relationship to unexpected inflation and default risk suggesting that REITs are not an effective hedge against inflation. On the other hand, increasing spreads in the yield curve and changes to expected inflation and were found to correlate positively with fund performance. The latter effect possibly being due to higher expected rents. These effects are greater for highly leveraged funds and those that adopt a stapled trust structure. This is expected given their greater reliance on debt and the wider set of operating activities which compound exposures to market and financial risk. These funds also exhibited a greater overall exposure to market risk. Size risk was also considered with small cap funds exhibiting greater exposure to the risk factors than medium and large funds.

The practical implications for asset allocation strategies is that portfolio managers and other investors seeking to take a long position may select highly leveraged funds with a stapled trust structure operating in a low interest environmental with higher expected inflation; whole those wishing to adopt a more defensive stance may consider less heavily geared funds with external management.

Keywords: REITs, securitised property, listed property trusts, capital asset pricing, multifactor asset pricing models, financial risk factors, inflation risk, credit spreads, default risk, property investment

1 Introduction

Real Estate Investment Trusts (REITs) offer investors a range of benefits that distinguish themselves from other asset classes. As an alternative to direct (unsecuritised) investment in property, REITs confer at least two advantages. The first is liquidity. The securitised nature of REITs allow investors to take positions in the sector without cumbersome transaction costs and lengthy delays in execution. The second is diversification. The relatively low unit cost enables the allocation of funds across the sector resulting in diverse portfolio holdings. Furthermore, as REITs are openly traded on securities exchanges, they operate in well established regulatory environments providing a level of governance that is typically not offered in the direct property market.

As a security, it offers the potential for capital appreciation and high rates of dividend yield. The latter occurs by virtue of the regulatory environment. In the United States for example, REITs are exempt from corporate income taxes if they distribute at least 95% of net income in the form of dividends to shareholders (Chen and Tzang, 1988). In Australia, no formal distribution requirements exist however, undistributed income is taxed at the highest marginal rate (46.5%) thus creating an incentive for full distribution (EPRA 2013).

These benefits however come at a cost. As an openly traded security, it faces exposure to risk factors inherent to equities such as market exposure, interest rate risk, default risk, inflation and so on. Chan, Hendershott & Sanders (1990) found that REITs typically experience lower exposure to market risk as opposed to common equities but greater sensitivity to interest rates, which is especially true for highly leveraged firms. Furthermore as REITs primarily derive their revenue from rents, higher inflationary expectations tend to improve rental yields, flowing through as higher distributions to investors. However, the same cannot be said for unexpected increases in inflation, which reduce performance. More recent studies confirm some of these findings. Peterson and Hsieh (1990) concluded that unexpected changes in interest rates and the probability of default significantly affected mortgage REIT performance but not equity REITs. Likewise, Cheong et al (2006) find evidence of a cointegrative relationship between performance and the stock market and long run interest rates.

Other studies have investigated the impact of firm characteristics on REIT performance. Common risk factors such as size and value (as measured by book to market equity) have been found to affect REIT performance. Other determinants have included leverage, liquidity and the value of underlying real estate owned by the fund (Chan, Hendershott & Sanders 1990; Conover, Friday & Howton 2000; Clayton & MacKinnon 2000; McIntosh, Liang & Tompkins 1991; Patel & Olsen 1984).

While there is a considerable volume of research on US based REITs, less attention has been devoted to the Australian market. Tan (2004) examined the effect of management structure and found evidence of outperformance by internally versus externally managed funds, which was consistent with the findings of Newell and Tan (2005) from an earlier study period. Lee, Robinson and Reed (2008) found a strong relationship between downside systematic risk and leverage, management structure and market capitalisation, though the explanatory power of the latter has diminished in recent years. Yong and Singh (2015) who investigated the impact of leverage and management structure determined that highly leveraged funds experienced greater sensitivity to adverse movements in long term interest rates; while internally managed REITs performed better during favourable economic conditions as such funds are permitted to engage in property development and/or fund management activities. Their findings were broadly consistent with earlier work by Stevenson et al. (2007), Ratcliffe and Dimovski (2007) and Newell and Peng (2009).

The objective of this study is to evaluate the exposure of REITs to common macroeconomic factors in the Australian market. The effects of management structure and gearing levels will be tested as well. Lastly, the impact of size on REIT performance is also considered. The next section provides an outline of methodology. Section 3 addresses data sources and collection methods. Results are presented in Section 4 and Section 5 concludes.

2 Methodology

The pricing of risky assets is an important theoretical and empirical issue in finance. The relationship between risk and return is most commonly articulated in the form of *asset pricing models*, which express returns as linear combination(s) of identifiable risk factors. The exact number, effect and persistence of these factors however vary across time and region making the identification of these factors and the estimation of their effects largely empirical in nature.

Merton (1973) argued that market exposure alone, while undeniably significant was an incomplete representation of the returns generating process suggesting that investors receive a premium not only for bearing market risk but also unfavourable shifts in the investment opportunity set. This was later tested by Gibbons (1980; 1982) through the incorporation of a set of changing state variables giving rise to *multi-factor models*.

Ross (1976) demonstrated how such models could be used to identify mispricing of assets thereby allowing profit via arbitrage. This led to the development of the Arbitrage Pricing Theory[1]. The 'theory' however was silent on the identity and nature of the relevant risk factors. This "rather embarrassing gap" was eventually addressed by Chen, Roll and Ross (1986) who determined that unexpected changes in inflation, national production, investor confidence and the yield curve were significant in explaining security returns. It is from these modern class of asset pricing models that this study draws its inspiration.

In principle, stock prices can be written as a function of discounted dividends:

$$p = f\left(\frac{E(c)}{r}\right)$$

where *c* represents a dividend stream and *r* is the discount rate. Therefore, systematic forces which affect either expected cash flows and/or the discount rate will influence returns. The discount rate takes into account the time value of money and is affected by changes in the level of interest and term structure spreads across different maturities. Therefore, unanticipated changes in the risk free rate will influence the time value of future cash flows and hence returns. The discount rate is also affected by the uncertainty of future cash flows. Unanticipated changes in the risk premium affects the stability of future cash flows which in turn influence prices and returns.

The effects of inflation on stock returns are not immediately clear. Inflation itself develops for a number of reasons and its effects vary across asset type. Unexpected changes in inflation can exert an effect on returns. Perhaps one of the more obvious explanations is that higher inflation leads to higher input costs[2] and lower levels of consumer spending resulting in declining profits. Returns may also be affected if inflation exceeds dividend growth resulting in reductions to income streams. This may be particularly true for income generating securities such as REITs.

[1] In fact, the CAPM may be thought of as a special case of the APT for which only one factor – market exposure is identified. For an excellent description, please see Elton, Gruber, Brown and Goetzmann (2016).
[2] via 'sticky' wages and/or prices

Other theories suggest that the link between inflation and returns depends on whether an asset is perceived to be a value or growth stock. Value stocks have strong current cash flows that diminish over time while growth stocks are characterised by the opposite. If an increase in inflation leads to a commensurate rise in interest rates[3] then growth stocks would experience greater discounted cash flows than value stocks as cash flows are generated further into the future. Therefore, growth stocks would be more negatively affected by periods of high inflation.

Lastly, the timing of inflation may also have a varying impact on asset prices. Inflation may correlate positively with stock returns during economic contractions. This stems from the notion that unexpected inflation may contain new information about forthcoming economic recovery.

However, if changes to inflation are expected, returns may improve to the extent that the security is able to act as a partial hedge against rising prices. REITs in particular may fulfil this role. Studies by Brueggaman, Chen and Thibodeau (1984); Ibbotson and Siegel (1984) and Hartzell, Hekman and Miles (1987) support this notion. Chan, Hendershott and Sanders (1990) however argue that these studies employed returns data based on market appraisals rather than actual transaction prices. Such data may be smoothed which understates the true volatility of real estate returns and overstates risk adjusted returns.

[3] A valid assumption given nominal interest rates and inflation are theoretically linked according to the Fisher equation

Economic factors

The economic factors employed in this study are based on the work of Chen, Roll and Ross (1986). These include: unexpected inflation, changes to expected inflation, changes to risk premia and the term structure of interest rates.

Inflation

Unexpected inflation is defined as the difference between actual and expected inflation:

$$UI(t) = I(t) - E[I(t)|t-1]$$

Where $I(t)$ is the natural logarithm of the ratio between $CPI(t)$ and $CPI(t-1)$. The series of expected inflation $E[I(t)|t-1]$ is derived using the methodology of Fama and Gibbons (1984). In principle, it is obtained via application of the Fisher equation:

$$TB(t-1) = E[RIR(t)|t-1] - E[I(t)|t-1]$$

Where $TB(t-1)$ represents the Treasury Bill rate at the end of period, $t-1$. $RIR(t)$ represents the real interest rate at period t which is calculated as the difference between $TB(t-1)$ and $I(t)$. $E[RIR(t)|t-1]$ is the expected real interest rate and is obtained using the methodology of Fama and Gibbons (1984). Expected inflation, $E[I(t)|t-1]$ is therefore calculated as the difference between $E[RIR(t)|t-1]$ and $TB(t-1)$.

Changes to expected inflation is defined as the difference between one period ahead expected inflation and expected inflation in the current period:

$$DEI(t) = E[I(t+1)|t] - E[I(t)|t-1]$$

Risk premia

Unexpected changes to the risk premium is defined as the difference in return between a portfolio of long term corporate bonds and long term government bonds:

$$URP(t) = BBB(t) - LGB(t)$$

Where $BBB(t)$ represents the return on BBB rated low-grade bonds and $LGB(t)$ represents the return on long term government bonds. $URP(t)$ would be zero in a default-free economy. Therefore, changes to $URP(t)$ can be interpreted as shifts in the probability of default.

Term structure

The term structure of interest rates is defined as the difference between long and short term government bonds:

$$TERM(t) = LGB(t) - TB(t-1)$$

Under the assumption of risk neutrality, TERM can be interpreted as reflecting the unexpected return on long term government bonds.

The following table provides a summary of the aforementioned variables:

Symbol	Variable	Description
I	Inflation	Log ratio in CPI between consecutive periods.
TB	Treasury Bill	Return on short term Government Securities represented by the 90 day bank accepted bill rate.
LGB	Long term Government Bond	Return on long term Government Securities represented by the 10 year treasury bond rate.
BBB	BBB rated Corporate bonds	Return on BBB rated Corporate bonds. This is used to calculate unexpected changes to the risk premium, URP
UI	Unexpected Inflation	Difference between actual and expected inflation. Expected inflation is further calculated as the difference between the Treasury bill rate and Expected Real Interest Rate.
RIR	Real Interest Rate	Difference between nominal interest and inflation represented by the Treasury bill rate and Inflation rate respectively.
DEI	Changes to Expected Inflation	Difference between one period ahead expected inflation and expected inflation in the current period.
URP	Unexpected change in Risk Premium	Difference between returns on a portfolio consisting of BBB rated low grade corporate bonds and Long Term Government Bonds.
TERM	Term structure	Difference between Long and Short term Government Securities.

Asset pricing tests

To test the sensitivities of returns to the aforementioned risk factors, the following factor model was used:

$$R = \beta_0 + \beta_1 STOCK + \beta_2 UI + \beta_3 DEI + \beta_4 URP + \beta_5 TERM + \varepsilon \quad (1)$$

where *R* is a vector of expected returns, STOCK represents the monthly logarithmic returns for the ASX200 stock market index; and the beta's are the loadings on the state variables. The effect of fund characteristics such as leverage, management structure, size and industry of operation was evaluated by dividing observations into portfolios based on the relevant criteria and estimating the factor model.

Leverage: To evaluate the effect of leverage, funds were divided into high and low debt groups based on gearing levels as measured by debt to capital ratios. Funds were considered as high debt (HD) if their debt to capital ratio exceeded the cross sectional average in the prevailing time period and low debt (LD) otherwise.

Management structure: Funds were divided into two portfolios: internally managed (stapled) and externally managed (traditional). Under a traditional trust, external parties perform many of the management functions such as tenant management, asset acquisition and disposal and negotiation of debt contracts. From 2005 onwards many A-REITs began internalising the asset management function and increasingly began to engage in property development activities resulting in stronger performance while simultaneously increasing risk exposure.

Size: A common risk factor not only among REITs but for equities in general, size risk measures the premium attached to small cap stocks. Funds with less than AUD$1bn in market capitalisation were considered *small*, while funds with a market capitalisation between AUD$1 – 3bn were considered *medium* and funds with a market capitalisation in excess of AUD$3bn were considered *large*.

3 Data

This study includes REITs listed on the Australian Stock Exchange (ASX) between 1995 and 2015. All financial variables including: adjusted closing prices[4], number of shares outstanding, debt to capital ratios[5], market capitalisation and market price indices were obtained from Datastream. Returns were calculated as the natural logarithm of price ratios in sequential periods. All financial variables were available at monthly frequency. Macroeconomic variables such as GDP, inflation, 90 day bank accepted bill rates and 10 year treasury bond rates are widely available from official public sources. BBB rated bond rates however were only available from 2005 onwards.

In total, there were 55 A-REIT entities available on Datastream. 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 AUD$100m in market capitalisation were not considered. Annualised summary statistics are presented in Table 1:

	A-REITs	**ASX200**	**UI**	**DEI**	**URP**	**TERM**
Arithmetic mean	5.66%	5.31%	0.97%	-0.12%	23.01%	5.03%
Geometric mean	3.12%	3.86%	0.74%	-0.17%	22.81%	4.42%
Median	9.53%	7.23%	0.56%	-0.04%	19.85%	5.32%
Standard Deviation	18.95%	15.11%	7.10%	1.41%	15.57%	9.19%
Skewness	-1.6026	-1.0797	0.4250	-0.4597	1.2358	-0.1072
Kurtosis	3.1446	1.8618	0.0188	-0.1824	1.0580	-0.7545
Number obs.	229	229	229	229	128	229

Table 1 Summary statistics for annualised rates of return for A-REITs and the ASX200 index. Unexpected Inflation (UI), Changes to Expected Inflation (DEI), Unexpected changes to the Risk Premium (URP) and Term structure of interest rates (TERM) have also been annualised.

[4] Adjusted for dividend payments, stock splits and so forth

[5] Defined as (Long Term Debt + Short Term Debt & Current Portion of Long Term Debt) / (Total Capital + Short Term Debt & Current Portion of Long Term Debt)

A-REITs outperformed the general stock market over the sample period but exhibited greater volatility. Mean returns however were substantially lower than median rates indicating negative skewness. This effect was stronger in A-REITs and can largely be attributed to the effects of the GFC which had a substantial impact on securitised property funds. Summary statistics during the pre-GFC, GFC and post-GFC periods are further presented in Table 2:

		A-REITs	ASX200	UI	DEI	URP	TERM
Pre-GFC	Arithmetic mean	11.89%	9.11%	0.29%	-0.06%	9.23%	6.33%
	Geometric mean	11.08%	9.52%	-0.14%	-0.09%	2.76%	5.23%
	Median	11.23%	9.40%	-1.09%	-0.09%	9.49%	6.08%
	Standard Deviation	9.24%	10.15%	7.54%	1.47%	4.09%	7.55%
	Skewness	0.0660	-0.4719	0.7533	-0.5649	-0.4077	-0.0304
	Kurtosis	0.5378	-0.0924	0.5203	0.1916	-0.4756	-1.2681
	Number obs.	133	133	133	133	32	133
GFC	Arithmetic mean	-34.00%	-18.23%	2.99%	-0.98%	39.54%	-8.79%
	Geometric mean	-35.83%	-17.94%	7.59%	-0.72%	47.73%	-3.60%
	Median	-35.77%	-19.88%	6.63%	-0.92%	33.74%	-9.37%
	Standard Deviation	23.26%	22.67%	9.16%	1.45%	18.47%	5.96%
	Skewness	0.7440	0.5479	-0.5446	0.0412	0.2760	1.1912
	Kurtosis	-0.2082	-0.5238	-1.3198	-1.4026	-1.6085	1.6336
	Number obs.	24	24	24	24	24	24
Post-GFC	Arithmetic mean	7.38%	6.13%	1.54%	0.05%	23.62%	7.23%
	Geometric mean	5.28%	1.85%	0.17%	-0.13%	20.30%	5.71%
	Median	6.39%	6.57%	0.86%	0.27%	21.49%	6.49%
	Standard Deviation	14.55%	12.64%	5.16%	1.20%	11.72%	9.02%
	Skewness	-0.0560	0.3250	0.1418	-0.2557	1.2293	0.1214
	Kurtosis	-0.2647	-0.3192	-0.7005	-0.8954	2.0413	-0.8941
	Number obs.	72	72	72	72	72	72

Table 2 Summary statistics divided into pre-GFC, GFC and post-GFC periods. Observations prior to August 2007 belonged to the pre-GFC phase. Observations between September 2007 and August 2009 were considered as the GFC phase while observations from September 2009 onwards were considered post-GFC.

When viewed from this perspective, it becomes apparent that A-REITs outperformed the general stock market during the pre-GFC era with higher returns and lower overall risk. During the GFC however, this pattern was reversed with A-REITs suffering heavy losses. Over the post-GFC recovery period, A-REIT performance improved (as did the general equities market) though not returning to pre-GFC levels. Another noteworthy observation is the effect of the GFC on average default risk premiums which roughly quadrupled during the crisis.

4 Results

Leverage and management structure

Results of the factor model regressions for portfolios consisting of ALL funds, HD vs. LD funds and internally (stapled) vs. externally (unit) managed funds are reproduced in Table 3.

	ALL Funds	***LD***	***HD***	***Stapled***	***Unit***
Constant	-0.0049	-0.0044	-0.004	-0.0053	-0.0038
STOCK	0.764***	0.8892***	0.6926***	0.7984***	0.6575***
UI	-1.4243***	-1.6415***	-1.6603***	-1.5475***	-1.1004***
DEI	4.7393***	3.9073**	5.5084***	4.8876***	4.0036**
TERM	1.0813***	0.4009	0.9438**	1.0723***	1.0171***
Adjusted R^2	0.400	0.402	0.402	0.396	0.377

Table 3 Results are based on estimations of Equation (1). *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively. Results indicate the varying levels of exposure to risk factors based on leverage and management structure.

All portfolios exhibited less than unitary market betas suggesting that REITs have relatively lower market exposure in general. Market risk is more prevalent in Low Debt funds and Internally managed funds as opposed to High Debt and Externally managed funds. Unexpected changes to inflation had a strongly significantly negative impact on REIT performance suggesting that securitised property may not be an effective hedge against inflation. Higher inflationary expectations however improved fund performance possibly due to higher expected rents. Lastly, wider spreads in the yield curve had a positive impact on fund performance. Conversely, narrowing spreads would have a negative impact. One possible explanation is that a narrow spread might be an indication of impending economic stress. During crisis episodes such as recessions, central banks are expected to lower interest rates. In such an environment, investors may prefer a steady income stream such as those offered by long term bonds. The resultant increase in demand for long term bonds bids up their prices and reduces yield flattening the yield curve.

Note that the default risk variable, URP was not included in this analysis. As previously mentioned, data for this variable was only available from 2005 onwards. Therefore, inclusion of this variable would have resulted in the loss of approximately half the observations. This variable was subsequently included in a separate set of regressions and the results are presented in Table 4.

	ALL Funds	***LD***	***HD***	***Stapled***	***Unit***
Constant	0.0067	0.0071	0.0093	0.0073	0.0039
STOCK	1.0197***	1.1319***	0.8645***	1.0719***	0.8918***
UI	-1.4146**	-0.9429	-1.6477**	-1.5138**	-1.1834
DEI	2.6304	2.2971	4.585*	2.2728	3.5587
TERM	1.1228**	0.5597	1.1749**	1.092**	1.2007**
URP	-0.7693*	-0.6362	-0.9768**	-0.8422**	-0.5451
Adjusted R^2	0.648	0.613	0.553	0.642	0.537

Table 4 Results are based on estimations of Equation (1). *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively. This model includes the URP variable which was only available from 2005 onwards. Therefore, results are only based on observations between 2005 and 2015

The impact of default risk is only evident in High Debt funds and Stapled trusts. This is to be expected given their added propensity for risk taking and the commensurate premia that must be paid to investors. HD funds for example borrowed aggressively to fund expansion; while stapled trusts are permitted to undertake development activities. Note the estimated effects may have been overstated as data for URP was not available prior to 2005 restricting the modelling period to 2005 onwards during which the GFC featured prominently.

Size

To estimate the impact of size, funds were divided into three categories: small, medium and large. Small funds were defined as having less than AUD$1bn in market capitalisation. Medium funds were defined as having between AUD$1 – 3bn in market capitalisation and Large funds were those in excess of AUD$3bn in market capitalisation. The results are presented in Table 5.

	Small	***Medium***	***Large***	***Small***	***Medium***	***Large***
Constant	-0.0064	-0.0068	0.0002	0.0085	0.007	0.0074
STOCK	0.7017***	0.8333***	0.8333***	1.003***	1.017***	0.9236***
UI	-1.6614***	-0.8412	-0.7635**	-1.6591**	-0.6053	-0.7369
DEI	5.7376***	3.8782*	0.0982	2.7598	3.4393	-0.7306
TERM	1.3046***	0.9483*	0.3661	1.4599***	0.8976	0.4339
URP				-0.8822*	-1.0204	-0.587
Adjusted R^2	0.305	0.239	0.463	0.605	0.281	0.529

Table 5 Results indicate the varying levels of exposure to risk factors based on size. Note the second half of the results include the URP variable which was only available from 2005 onwards, restricting the sample period accordingly.

All portfolios exhibited some degree of exposure to market risk with larger funds having marginally greater exposure. Small and Large funds were inversely related to unexpected increases in inflation while changes to expected inflation had a positive impact for small and medium sized funds. Small funds also exhibited a greater exposure to term structure changes while medium and large funds were less sensitive. Lastly, default risk was only significant for small funds. Overall, small funds had a greater exposure to the various risk factors than larger funds, which were driven predominantly by market exposure.

5 Conclusions

The arbitrage pricing model of Chen, Roll and Ross (1986) explored the relationship between returns and a set of risk factors including industrial production, unexpected inflation, changes to expected inflation, default risk premiums and the term structure of interest rates. These risk factors have been shown to have a direct relationship to returns in the REIT sector and common equities in general. This study has examined the impact of these risk factors on Australian REITs and most of its conclusions are broadly consistent with findings from well established studies of the US market.

In general, A-REITs exhibited lower levels of market exposure. Inflation on the other hand had a dual effect. Unexpected increases in inflation had a negative impact on performance suggesting that REITs are not an effective hedge against inflation. Changes to expected inflation however had a positive effect, possibly due to higher expected rents. Higher spreads in the yield curve correlated positively to returns while unexpected increases in default risk had a negative impact.

In terms of gearing levels, highly leveraged funds exhibited less exposure to market risk but greater exposure to unexpected inflation. Changes to expected inflation however were of greater benefit to highly leveraged funds as were wider interest spreads. These funds however performed poorly during unexpected increases in the risk premium suggesting that higher gearing levels increased exposure to default risk.

With regard to management structure, internally managed funds were found to have greater exposure to market risk and unexpected inflation. However, they exhibited superior performance when inflation was expected to rise. Not surprisingly, given their additional involvement in development activities, stapled funds also experienced greater exposure to default risk.

Regarding size effects, small cap funds displayed a higher degree of exposure to market risk, unexpected inflation, changes to the term structure and default risk while medium and large funds were driven predominantly by market risk alone.

The implications for asset allocation strategies is that portfolio managers and other investors seeking to take a long position may select highly leveraged funds with a stapled trust structure operating in a low interest environmental with higher expected inflation; whole those wishing to adopt a more defensive stance may consider less heavily geared funds with external management.

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