Debt and REIT performance: Evidence from Australia

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Abstract: Firms finance operations in one of three ways: retained earnings, debt or the issuance of equity. The Australian REIT sector experienced phenomenal growth in the early 2000s outperforming the ASX200 as funds borrowed aggressively to fuel expansion. However, the sector collapsed during the financial crisis of 2007-09 which was due in part by its heavy reliance on debt and increased exposure to financial risk. Since then, the sector has recovered under a low interest environment while capital structures have been reconfigured through a combination of debt retirement and equity raisings.

This study aims to explore the relationship between debt and the performance of the REIT sector in Australia which is important as over AUD114bn are currently invested in the property sector via superannuation funds (pension funds) representing approximately 8 percent of total holdings.

Utilising panel data from the Australian market over a 20 year period spanning multiple economic cycles, REIT performance was found to have an inverse relationship to leverage even after controlling for factors such as market risk, inflation and economic growth. The adverse effects are further compounded with increasingly higher levels of gearing. Additionally funds with low interest coverage ability and insufficient free cash flows also exhibit greater exposure to gearing risk.

The practical implications for asset allocation strategies is that portfolio managers and other investors considering A-REITs must examine the fund's reliance on debt as well as their ability to cover interest expenses, generate free cash flow and ultimately service repayment obligations.

Keywords: REITs, securitised property, listed property trusts, capital structure, corporate finance, capital asset pricing, multifactor asset pricing models, financial risk factors, panel data, longitudinal analysis, leverage, random effects, property investment

1 Introduction

Firms finance operations in one of three ways: retained earnings, debt or the issuance of equity. The proportion of debt and equity is referred to as capital structure. Debt may confer tax advantages as interest payments are commonly tax deductable. Furthermore, debt does not dilute ownership and in a low interest environment, may represent a cheap and accessible source of funds. By contrast, equity dilutes ownership however it does not need to be repaid if earnings decline.

Real Estate Investment Trusts (REITs) were first introduced in the US in the 1960s. Shortly thereafter, REITs began to emerge on the Australian stock exchange in the 1970s. Though relatively dormant for much of the 1980s, Australian REITs (A-REITs) gained popularity in the 1990s as a result of strong returns and overall performance of the sector. The number of active funds quickly grew from 17 in June 1988 to 71 in December 2006. Much of this growth was driven by aggressive use of debt financing as shown in Figure 1.

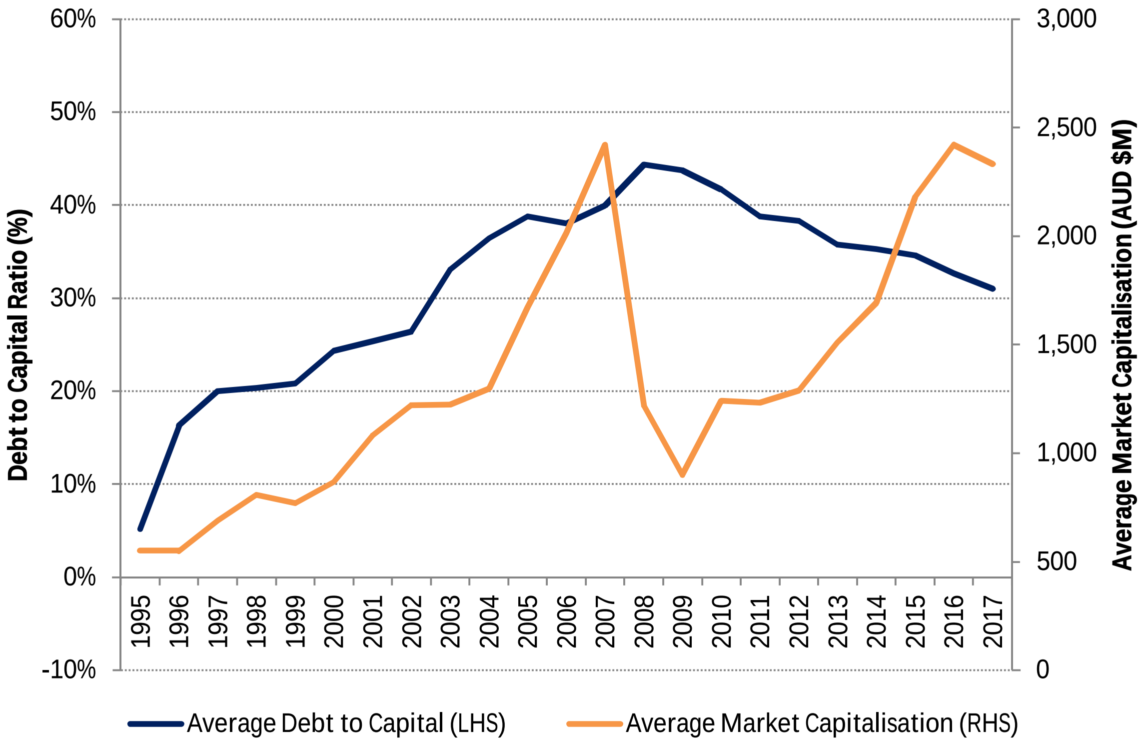

Figure 1: Average Debt to Capital and Market Capitalisation of Australian REITs: 1995 – 2017. Source: Datastream

Between 1995 and 2007, the market value for the average A-REIT grew from AUD 500M to 2.5bn while the average gearing ratio grew from 5.18% to 39.94% over the same period. However, the financial crisis of 2007-09 eliminated much of these gains leaving many funds in financial distress. Since 2009, the sector has recovered flourishing under a low interest environment outperforming general equities. At the same time, there has been a general reconfiguration of capital structure in the sector through a combination of debt retirement and equity raisings. Studies have suggested that financial losses were compounded by the heavy reliance on debt leaving the sector over exposed to financial risk (De Francesco, 2007; Dimovski, 2009; Zarebski and Dimovski, 2012).

Securitised property is especially important in Australia as it features largely in the asset allocation of superannuation funds (pension funds). Compulsory superannuation was introduced in 1992 with most employees receiving 9.5% of their ordinary earnings as superannuation contributions. By 2017, superannuation funds held over AUD 1.4 trillion in total assets. Approximately AUD 114 billion (8.09%) were held as property, which is comprised of direct and indirect investment via REITs (formerly known as listed property trusts) (APRA, 2017). The top ten largest superannuation funds as well as the total for all funds and their respective asset allocations for 2017 is depicted in Table 1.

Superannuation Fund	Cash	Fixed[1]	Equity	Property	Infra.	Comm.	Other
AustralianSuper	9.54%	18.40%	51.98%	8.74%	11.07%	0.00%	0.25%
QSuper	9.24%	33.92%	37.51%	7.83%	10.06%	1.12%	0.32%
MLC Super Fund	14.86%	20.32%	54.63%	5.53%	1.33%	0.03%	3.30%
Public Sector Super	13.83%	14.74%	46.77%	11.88%	1.21%	0.01%	11.57%
Colonial First State	16.87%	22.84%	45.46%	5.17%	3.33%	0.00%	6.34%
First State Super	8.98%	22.96%	54.20%	7.57%	1.69%	0.27%	4.34%
CSS Fund	21.09%	14.73%	42.02%	10.67%	1.08%	0.01%	10.39%
Unisuper	12.33%	13.08%	45.43%	12.54%	15.91%	0.00%	0.72%
Retirement Wrap	10.44%	24.03%	51.52%	7.01%	1.17%	0.46%	5.37%
AMP Superannuation	11.41%	19.82%	54.15%	7.30%	0.54%	0.06%	6.71%
...							
All Funds	12.55%	21.06%	49.79%	8.09%	5.11%	0.14%	3.26%

Table 1: Asset allocation for the top ten largest Australian superannuation funds in 2017. Source: Australian Prudential Regulatory Authority (APRA)

Given the importance of the property sector to the wealth of the Australian populace and the impact of debt on securitised property, this studies aims to explore the relationship between leverage and fund performance of Australian REITs. The remainder of this document is structured as follows: Section 2 provides a review of literature. Methodology and data are discussed in sections 3 and 4 respectively. Results are presented in section 5 and section 6 concludes.

2 Literature Review

In their seminal paper, Modigliani and Miller (1958) argue that capital structure is irrelevant to firm value as the cost of debt and the cost of equity will be driven to parity in the absence of return uncertainty. In subsequent work, Hamada (1969) presents evidence to support the Modigliani Miller propositions and by extension the irrelevance of capital structure. In a follow up paper, Stiglitz (1974) also demonstrates this irrelevance under a general set of conditions.

By contrast, Kraus and Litzenberger (1973) argue that the existence of tax deductions arising from interest repayments and the penalties from bankruptcy invalidate the assumption of capital structure irrelevance. Firms determine the optimal mix of debt and equity based on the costs of debt such as financial distress and potential bankruptcy against its benefits which include tax savings. Known as the *trade off theory of capital structure*, the theory implies an optimal mix of debt and equity. Jensen and Meckling (1976) advance the theory by incorporating agency costs arguing that the presence of debt in the capital structure generates conflicts between shareholders and creditors. Myers (1977) further explores the agency problem. Known as the *underinvestment problem*, issues arise when firms forego otherwise profitable investment opportunities as debt holders capture a larger portion of the benefits while reducing returns to shareholders. Since these investments would ultimately increase the overall value of the firm but do not happen, there is a 'problem'. In a meta-analysis, Harris and Raviv (1991) find that greater use of debt in the capital structure reduces the repayment ability of firms.

[1] Fixed = Fixed Income; Infra. = Infrastructure; Comm. = Commodities

In related work, Myers and Majluf (1984) propose the *pecking order theory* which states that firms adhere to a hierarchy of financing sources beginning with internal funds if available, followed by debt and when this is exhausted or can no longer be obtained at favourable terms, the issuance of equity. The pecking order theory therefore suggests an inverse relationship between debt and retained earnings which is confirmed in subsequent studies (Titman and Wessels, 1988; Frank and Goyal, 2009; Lemmon and Zender, 2010; Kayo and Kimura, 2011; Iluykhin, 2015).

Based on the work of Myers (1977) and Jensen (1986), Stulz (1990) explores the impact of financing policy on agency costs. Stulz (1990) argues that managerial discretion results in two costs: overinvestment and underinvestment. By imposing a repayment schedule, a debt issue mitigates the overinvestment cost but exacerbates the underinvestment cost. Conversely an equity issue reduces the underinvestment cost but worsens the overinvestment cost. This suggests that the presence of debt has both positive and negative effects which are simultaneously present in all firms.

McConnell and Servaes (1995) argue that the critical element absent from the studies of Myers (1977), Jensen (1986) and Stulz (1990) is the impact of a firm's opportunity set. McConnell and Servaes (1995) agree with Stulz (1990) that debt acts as a disciplinary measure preventing management from undertaking wasteful projects. However, for 'high growth' firms for whom there is an abundance of positive NPV projects, debt can actually have a negative impact as management is prevented from investing in good projects. Therefore, a debt issue will have a negative effect on high growth firms. Conversely, for 'low growth' firms for whom there is a shortage of positive NPV projects, debt can have a positive impact as management is prevented from investing in wasteful projects. Therefore, a debt issue will have a positive effect on low growth firms.

On the basis of these theories, several empirical studies have determined a positive relationship between debt and performance (Taub, 1975; Hadlock and James, 2002; Margaritis and Psillaki, 2010; Gill, Biger and Mathur, 2011); while others find no significant impact (Fama and French, 1998; Simerly and Li, 2000; Zeitun and Tian, 2007; Soumadi and Hayajneh, 2008).

Other avenues of enquiry have explored the impact of firm level characteristics such as size and liquidity. For example, Titman and Wessels (1988) suggest large firms prefer equity financing due to lower costs as they have less information asymmetry compared to small firms and are thus better able to secure equity financing. Other theories emphasize the link between size and financial distress stating that the probability of default varies inversely with size. Rajan and Zingales (1995) however find conflicting evidence noting that leverage and size have a positive correlation among Japanese firms but the reverse is true for German firms. Diamond (1991) focuses on liquidity risk suggesting that firms with significant liquidity risk have insufficient cash flows to support long term debt and thus must rely on short term debt. Stohs and Mauer (1996) extend this research by utilising a more comprehensive measure of debt and find that firms with poor credit rating tend to rely more heavily on bank debt while firms with better credit rating utilise directly placed debt instruments such as debentures and commercial paper.

This issue has been widely studied in a variety of international equity markets. Notable studies from the USA include Titman and Wessels (1988), Fama and French (2002), Frank and Goyal (2004). British studies include Marsh (1982), Bevan and Danbolt (2002). See also Panno (2003) for Italian firms, Drobetz and Fix (2003) for Swiss firms; and Alonso, Iturriaga and Sanz (2005) for Spanish firms. Additionally, studies such as Rajan and Zingales (1995) and Antoniou, Guney and Paudyal (2002) conduct analysis across several European and Asian economies. However, to the best of our knowledge, no similar studies currently exist for the Australian REIT sector.

3 Methodology

To explore the relationship between debt and fund performance, panel regressions were employed utilising an asset pricing model within a framework that is consistent with the risk-return paradigm. Asset pricing models express returns as linear combination(s) of identifiable risk factors. The resultant coefficient estimates represent the sign and magnitude of the asset's exposure to the respective risk factors.

One of the key advantages of panel regression over OLS regression is the ability to control for unobservable factors that remain constant within individuals but vary between individuals. That is, it accounts for individual heterogeneity. This is of particular relevance in an asset pricing context as the returns generating process is often a result of both systematic and idiosyncratic risk factors. The latter may consist of both observable and unobservable factors. Panel regressions therefore, have the ability to control for such unobservable factors.

Empirically, panel models may possess statistically desirable properties such as greater accuracy in parameter inference as panel data usually contain more degrees of freedom and sample variability than cross sectional data (which may be viewed as a panel with T = 1 period), or time series data (which is a panel of N = 1), hence improving the efficiency of parameter estimates (Hsiao, 2014).

3.1 The asset pricing model

Most asset pricing models include a combination of systematic and idiosyncratic risk factors. The former is 'common' to all assets within the class, such as macroeconomic 'state' variables; while the latter may be firm specific. The variables utilised in this study capture a range of risk factors including: market risk, expected inflation, unexpected inflation, industrial production and leverage. Additionally, portfolios were constructed on the basis of gearing ratios, interest coverage ratios and free cash flow per share. These variables were tested and found to affect the degree of sensitivity of returns to leverage.

Market risk

Various studies have demonstrated a positive exposure of REIT returns to market indices (Mengden and Hartzell, 1986; Ross and Zisler, 1987, 1991; Ennis and Burik, 1991; Gyourko and Keim, 1992; Liu and Mei, 2003; Li and Wang, 1995; Peterson and Hsieh, 1997; Karolyi and Sanders, 1998). Chan, Hendershott and Sanders (1990) apply a multifactor arbitrage pricing model to the cross section of REIT index returns and determine that exposure to market returns, unexpected inflation and the term structure of interest rates explain approximately 60 percent of variation.

Peterson and Hsieh (1997) find evidence of a relationship between REIT returns and market returns as well as common risk factors such as size and value (as measured by book-to-market equity). Utilizing a multi-beta asset pricing model, Karolyi and Sanders (1998) find that "stock market and term structure risk premium variables are important for REIT returns, which (they) interpret as evidence of REITs as a hybrid of stocks and bonds in terms of their risk exposures" (p.246).

The market rate of return (STOCK) is therefore calculated as the natural logarithm of the ASX200 stock price index in consecutive periods:

$$STOCK = ln\left(\frac{index_t}{index_{t-1}}\right)$$

Inflation

The effect of inflation on REIT returns is not immediately clear. One set of views suggests that the relationship to inflation depends on whether REITs possess characteristics similar to those of fixed income securities versus those of equities. On the one hand, the regularity and magnitude of distributions paid to shareholders suggest bond like qualities (Cheong et al. 2009; McMahan, 1994). This occurs because many jurisdictions require funds to pay a substantial portion of their income as dividends in order to be classified as a REIT.

On the other hand, the sensitivity of REIT returns to known common risk factors of equities such as market risk, fund size and leverage suggest equity like characteristics. Glascock, Lu and So (2000) and Glascock and Lu-Andrews (2014) for example, argue that by acting as perverse inflation hedges, REITs have evolved to assimilate stock market features. Similar results have been found in other studies (Gyourko and Linneman, 1988; Goebel and Kim, 1989; Titman and Warga, 1989; Park et al., 1990; Chan et al., 1990; Liu et al., 1997).

The Fisher equation predicts that the real rate of return on an asset is equal to its nominal rate less inflation. That is, any increases (reductions) to inflation must be met with a commensurate increase (reduction) to nominal returns if the real rate of return is to be maintained. However, this link (between returns and inflation) is dependent on asset class. Fama and Schwert (1977) demonstrate that fixed income securities such as bonds and government securities were a complete hedge against expected inflation while private residential real estate was a complete hedge against both expected and unexpected inflation. Conversely, common stocks were negatively related to expected inflation and "probably also to the unexpected component" (p.115). Therefore, positive correlation to inflation measures suggest defensive properties comparable to fixed income securities while the opposite implies greater similarity to common stocks.

According to Chen, Roll and Ross (1986), inflation consists of two components: expected and unexpected 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:

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

Industrial production

The index of industrial production was obtained from the Australian Bureau of Statistics (ABS) and measures changes to industrial activity across key sectors of the economy including: mining, manufacturing, construction, agriculture, forestry, fishing, utilities and professional services. Changes to the index may be indicative of fluctuations in macroeconomic activity, economic output and employment. It is constructed using a combination of data collected by the Economic Activity Survey (EAS) and Business Activity Statements (BAS) which all registered businesses must submit to the Australian Tax Office (ATO).

Leverage

Leverage was measured at the firm level by dividing total debt by total capital. Total debt represents all interest bearing and capitalised lease obligations. It is the sum of long and short term debt. Total capital represents the total investment in the company. It is the sum of common equity, preferred stock, minority interest, long-term debt, non-equity reserves and deferred tax liability in untaxed reserves.

3.2 Asset pricing tests

To test the sensitivities of returns to the aforementioned risk factors, the following equation was estimated via pooled OLS, fixed effects and random effects estimation procedures:

$$R_{it} = \beta_0 + \beta_1 STOCK_t + \beta_2 DEBT_{it} + \beta_3 UI_t + \beta_4 DEI_t + \beta_5 IP_t + \varepsilon_{it} \tag{1}$$

Variable descriptions are summarised below:

Symbol	Variable	Description
R_{it}	Returns	Return of the i^{th} fund in period t. Returns were calculated as the natural logarithm of price ratios in sequential periods.
$STOCK_t$	Market returns	$STOCK_t$ represents the monthly returns for the ASX200 stock price index.
$DEBT_{it}$	Leverage	$DEBT_{it}$ represents the leverage of the i^{th} fund in period t. It is computed by dividing total debt by total capital.
UI_t	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.
DEI_t	Changes to Expected Inflation	Difference between one period ahead expected inflation and expected inflation in the current period.
IP_t	Industrial Production	Index measuring industrial activity across key sectors of the economy.

Pooled OLS results were used as a baseline reference while the Hausman test was used to determine the appropriateness of random or fixed effects models. Under the assumption that no significant differences exist between coefficient estimates, the random effects model is preferable as it is a more efficient estimator.

Additionally, portfolios based on common measures of financial health were constructed and the asset pricing model was applied to these portfolios to determine the impact of debt on returns. These measures include financial leverage, the interest coverage ratio and free cash flow per share.

Interest coverage ratio: A common indicator of the firm's ability to meet its debt obligations, the interest coverage ratio is computed by dividing earnings before interest and taxes (EBIT) by interest expense on debt. A ratio of one suggests that firm earnings are just sufficient to cover debt repayments. Conversely, a ratio below one suggests that the firm is unable to meet its debt obligations while ratios greater than one indicate the opposite.

Free cash flow per share: Another common accounting measure, free cash flow (FCF) is generally agreed upon as the measure of cash flow that is available to stakeholders of the firm. It is calculated by subtracting capital expenditure from operating cash flow. Free cash flows that are close to zero may indicate that the firm is experiencing difficulty delivering on promised payments which in turn could indicate higher default risk.

4 Data

REIT funds were observed between 1995 and 2017. This sample period was selected for several reasons. Firstly, REITs were a relatively uncommon feature of the Australian Stock Exchange prior to 1995. Therefore, analysis prior to this period could be susceptible to small sample bias. Secondly, the sample period is sufficiently wide to capture several crisis episodes including the 1997 Asian currency crisis, the global financial crisis of 2007-09 and to a lesser extent the recession of the early 2000s, thereby providing a rich set of data spanning several economic cycles.

Financial and accounting variables such as returns, debt, capital, earnings, free cash flow and so on were obtained from Datastream while economic variables such as inflation, interest rates, industrial production, etc. are widely available from official sources such as the Reserve Bank of Australia (RBA), the Australian Prudential Regulatory Authority (APRA) and the Australian Bureau of Statistics (ABS).

In total, 54 REIT entities were observed over 276 months resulting in 5,764 firm-months. The panel was unbalanced given the relative scarcity of observations in the early portions of the study period however the panel was better populated towards latter portions of the study period as REITs became more common. Descriptive measures are summarised in Table 2.

Variable		Mean	Std. Dev.	Min	Max	Observations
RETURN	overall	-0.0037	0.2426	-4.6052	6.2146	N = 5764
	between		0.0473	-0.2659	0.0266	n = 52
	within		0.2415	-4.5029	6.3169	T-bar = 110.846
STOCK	overall	0.0034	0.0415	-0.1374	0.1281	N = 5764
	between		0.0036	-0.0125	0.0172	n = 52
	within		0.0414	-0.1392	0.1327	T-bar = 110.846
DEBT	overall	0.3227	0.2030	0.0000	1.4288	N = 5764
	between		0.1679	0.0000	0.7249	n = 52
	within		0.1447	-0.2242	1.0266	T-bar = 110.846
UI	overall	0.0011	0.0068	-0.0237	0.0260	N = 5764
	between		0.0010	0.0000	0.0043	n = 52
	within		0.0068	-0.0239	0.0264	T-bar = 110.846
DEI	overall	0.0000	0.0020	-0.0115	0.0076	N = 5764
	between		0.0003	-0.0013	0.0008	n = 52
	within		0.0020	-0.0116	0.0076	T-bar = 110.846
IP	overall	75.4460	33.8679	0.0000	108.3000	N = 5764
	between		28.1622	0.0000	96.9353	n = 52
	within		31.8763	-14.5108	166.5920	T-bar = 110.846

Table 2: Summary statistics indicating variable means; and overall, between and within group variation at monthly frequency.

Overall returns in the A-REIT sector failed to outperform broader equities however much of this underperformance may be attributed to heavy losses in the sector during the GFC period. Overall debt levels in the A-REIT sector were 32.27% during the study period.

Prior to the GFC, the A-REIT sector outperformed general equities with higher overall returns. Overall debt levels were 26.50% of total capital. During the GFC, the sector experienced losses approximately three times greater than general equities. Overall debt levels increased to 40.81% on average. During the post-GFC recovery phase, the sector rebounded but failed to outperform general equities. However, much of this underperformance can be attributed to weak performance in 2017 amid fears of a softening property sector, low wage growth and potential recessionary pressure. Overall debt levels in the sector reduced to 33.40% as a result of capital re-structuring efforts. This information is summarised in Table 7.

5 Results

Equation (1) was estimated via pooled OLS, fixed effects and random effects estimation. Results are summarised in Table 3.

Variable	Pooled OLS	Fixed Effects	Random Effects
STOCK	0.8932***	0.8931***	0.8932***
DEBT	-0.0265*	0.0004	-0.0265*
UI	-2.108***	-2.113***	-2.108***
DEI	8.0587***	7.8975***	8.0587***
IP	0.0132	0.0154	0.0132
Constant	-0.0057	-0.016	-0.0057
Adjusted R^2			
Within	0.0319	0.0321	0.0319
Between		0.2179	0.2009
Overall		0.0322	0.0327
Hausman (p-value)			7.74 (0.1710)

Table 3: Estimation of Equation (1) via Pooled OLS, Fixed effects and Random effects. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively.

The Hausman test statistic was statistically insignificant. Recall that under the null hypothesis of the Hausman test, there are no statistically significant differences between the coefficients of the fixed effects and random effects model. Therefore, failure to reject the null hypothesis would suggest the use of random effects over fixed effects as the former possesses superior statistical properties, namely greater efficiency of coefficient estimates.

Estimates of market beta were less than one suggesting relatively lower market exposure for the REIT sector, which is consistent with other studies (Chan, Hendershott and Sanders, 1990). Additionally, there was a statistically significant negative relationship between debt and returns indicating that firm performance worsens with rising gearing levels. Under the random effects model, a 1% increase in debt to capital resulted in a 0.0265% reduction in monthly returns. Fund performance was also found to vary inversely with unexpected inflation suggesting that A-REITs were not an effective hedge against inflation. This is consistent with the work of Gyourko and Linneman (1988), Goebel and Kim (1989), Titman and Warga (1989), Park et al. (1990), Chan et al. (1990) and Liu et al. (1997). Lastly, Higher inflationary expectations improved fund performance possibly due to higher expected rents.

Leverage

To explore the effect of gearing levels on debt sensitivity, funds were divided into portfolios based on debt to capital ratios and equation (1) was re-estimated. The results are shown in Table 4.

	DEBT < 0.20		DEBT ≥ 0.20		DEBT ≥ 0.40		DEBT ≥ 0.60	
	FE	**RE**	**FE**	**RE**	**FE**	**RE**	**FE**	**RE**
STOCK	0.364	0.380	1.019***	1.019***	1.171***	1.172***	1.599***	1.624***
DEBT	-0.216	0.004	-0.074***	-0.078***	-0.064*	-0.107***	0.015	-0.120*
UI	-2.272	-2.254	-1.967***	-1.958***	-2.067***	-1.956***	-2.57	-2.505
DEI	8.527	9.690	7.325***	7.278***	8.077***	8.02***	2.616	2.456
IP	0.038	0.037	0.01**	0.01**	0.021*	0.019	0.079	0.057
Constant	-0.022	-0.033	0.018**	0.021***	0.006	0.031*	-0.108	0.008
Adjusted R^2								
Within	0.0032	0.0026	0.1824	0.1815	0.1641	0.1624	0.1571	0.1538
Between	0.0000	0.1988	0.3165	0.3662	0.2977	0.4374	0.6499	0.7473
Overall	0.0027	0.0031	0.1851	0.1847	0.1701	0.1729	0.1632	0.1703
Hausman: p-value		0.9317		0.9778		0.6013		0.2155

Table 4: Fixed effects (FE) and random effects (RE) estimates of equation (1) for Debt sorted portfolios. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively.

Hausman tests indicated no statistical difference in the coefficient estimates between fixed and random effects models. Therefore, the random effects models were selected on the basis of efficiency. For funds with a debt ratio of less than 20%, debt was not a significant risk factor for fund performance. However, funds with a debt ratio greater than 20% exhibited a strongly significant exposure to debt. A 1% increase in debt ratio beyond 20% resulted in an estimated 0.078% reduction in monthly returns. This effect continued to increase in funds with higher debt ratios. A 1% increase in debt ratio beyond 40% resulted in an estimated 0.107% reduction in monthly returns while the same increase in debt ratio beyond 60% resulted in an estimated 0.120% reduction in monthly returns. This result is not unexpected given that higher gearing ratios potentially affect debt serviceability increasing the risk of default.

Interest coverage

Another common indicator of debt serviceability is the interest coverage ratio, which is obtained by dividing earnings before interest and taxes (EBIT) by the interest expense on debt. Funds were divided into coverage sorted portfolios and equation (1) was re-estimated. The results are shown in Table 5.

	Coverage ≤ 0		Coverage ≤ 1		Coverage ≤ 2		Coverage ≤ 3		Coverage ≤ 4	
	FE	**RE**	**FE**	**RE**	**FE**	**RE**	**FE**	**RE**	**FE**	**RE**
STOCK	1.84***	1.88***	1.61***	1.65***	1.38***	1.39***	1.25***	1.26***	1.2***	1.2***
DEBT	-0.04	-0.07**	-0.01	-0.06**	-0.04	-0.05**	-0.03	-0.04***	-0.03	-0.04***
UI	-2.98**	-1.91	-3.31***	-2.16**	-2.6***	-2.24***	-2.46***	-2.15***	-2.2***	-1.99***
DEI	5.8**	4.74*	5.64**	4.49**	6.94***	6.51***	7.42***	7.24***	7.37***	7.3***
IP	0.05	0.05**	0.06**	0.05**	0.05**	0.05***	0.05***	0.05***	0.04***	0.05***
Constant	-0.05	-0.04	-0.06**	-0.04*	-0.04*	-0.04**	-0.04**	-0.04***	-0.04**	-0.04***
Adjusted R^2										
Within	0.2229	0.2217	0.2078	0.2057	0.1974	0.1972	0.1899	0.1897	0.1878	0.1876
Between	0.2928	0.3590	0.2600	0.3721	0.1453	0.1596	0.0920	0.1078	0.0757	0.0905
Overall	0.2262	0.2286	0.2044	0.2089	0.1956	0.1959	0.1894	0.1897	0.1875	0.1879
Hausman: (p-value)		0.5482		0.2219		0.3113		0.1624		0.2220

Table 5: Fixed effects (FE) and random effects (RE) estimates of equation (1) for Interest coverage sorted sorted portfolios. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively.

As before, Hausman tests indicated no statistical difference in coefficient estimates between fixed and random effects.

Funds with lower coverage ratios were more sensitive to gearing risk. For funds with a negative coverage ratio, a 1% increase in debt ratio resulted in 0.07% reduction in monthly returns. For funds with a coverage ratio of less than 1, a 1% increase in debt ratio resulted in 0.06% reduction in monthly returns. As coverage ratios increased, gearing risk decreased. For example, in funds with a coverage ratio of less than 4, a 1% increase in debt ratio resulted in 0.04% reduction in monthly returns. This result is not surprising given that higher coverage ratios indicate greater ability to service debt obligations.

Free cash flow

Similar to the coverage ratio, free cash flow (FCF) can be used as an indicator of debt serviceability. FCF represents the cash available to a firm after operational expenditures and capital maintenance; and is used for debt and dividend payments. FCF per share was computed and funds were sorted into five portfolios based on this measure and equation (1) was re-estimated. The results are summarised in Table 6.

	FCF ≤ 0.00		FCF ≤ 0.05		FCF ≤ 0.10		FCF ≤ 0.15		FCF ≤ 0.20	
	FE	**RE**	**FE**	**RE**	**FE**	**RE**	**FE**	**RE**	**FE**	**RE**
STOCK	0.53**	0.55**	0.65***	0.67***	0.82***	0.83***	0.96***	0.97***	0.96***	0.97***
DEBT	-0.03	-0.06*	0.02	-0.04**	0.00	-0.03**	-0.01	-0.02*	-0.01	-0.02**
UI	-0.59	-1.16	-1.59**	-1.68**	-1.89***	-1.99***	-1.86***	-1.87***	-1.99***	-1.99***
DEI	4.39	5.16	6.8**	6.3**	7.71***	7.82***	6.57***	6.56***	7.35***	7.31***
IP	0.03	0.03	0.03**	0.04***	0.02**	0.03***	0.02***	0.02***	0.02***	0.02***
Constant	-0.03	-0.01	-0.04***	-0.03**	-0.03***	-0.02**	-0.02***	-0.01*	-0.01**	-0.01
Adjusted R^2										
Within	0.0136	0.0127	0.0394	0.0357	0.0844	0.0828	0.1227	0.1223	0.1346	0.1344
Between	0.3238	0.4242	0.0989	0.4063	0.1159	0.2618	0.0737	0.1638	0.1273	0.1901
Overall	0.0235	0.0270	0.0389	0.0466	0.0863	0.0895	0.1226	0.1239	0.1345	0.1352
Hausman: (p-value)		0.8394		0.4801		0.8490		0.9220		0.5652

Table 6: Fixed effects (FE) and random effects (RE) estimates of equation (1) for portfolios sorted by free cash flow per share. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels of significance respectively.

According to random effects estimates, funds with negative FCF per share exhibited much greater gearing risk with as much as 0.06% reduction in monthly returns from a 1% increase in debt to capital ratio. However, this effect stabilized for funds with FCF per share of AUD 0.15 or more. In such cases, monthly returns reduced by approximately 0.02% for a 1% increase in debt ratio. As before, this result is not unexpected given that FCF is a commonly used indicator of financial health and default risk.

6 Conclusion

This study has explored the relationship between debt and fund performance for Real Estate Investment Trusts listed on the Australian stock exchange. Under the classical work of Modigliani and Miller (1958), capital structure is irrelevant in determining firm value as the costs of debt and equity will be driven to parity in the absence of returns uncertainty. However, subsequent works have challenged this notion arguing that the existence of favourable tax treatments and the costs of bankruptcy arising from debt issuance fundamentally alter the underlying calculus.

For example, Stulz (1990) argues that managerial discretion results in two types of agency costs: underinvestment and overinvestment; and both are simultaneously present in all firms. By imposing repayment obligations, debt issuance can act as a disciplinary measure preventing management from engaging in wasteful projects mitigating the overinvestment problem but exacerbating the underinvestment problem. Equity on the other hand, has the opposite effect.

McConnell and Servaes (1995) extend this by exploring the impact of the firm's opportunity set. For 'high growth' firms, which have an abundance of positive NPV projects, debt issuance may in fact hinder performance as management are constrained from fully exploiting all profit opportunities. The reverse is true for 'low growth' firms who actually benefit from not engaging in otherwise wasteful projects.

The overarching finding from this study suggests that REITs in the Australian context have not benefited from the use of debt. When viewed through an asset pricing framework, the empirical results indicate that in most cases, debt presents itself as a negative risk factor with an inverse relation to returns which is present even after controlling for factors such as market risk, inflation and economic growth.

In the context of literature, these findings suggest that for A-REITs, the positive effects of debt (mitigating overinvestment for example) have failed to offset the negative effects. These negative effects are further exacerbated for funds who are already heavily leveraged, have low interest coverage ability and generate insufficiently low free cash flows. On the other hand, funds with 'low' debt ratios (possibly less than 20%) do not appear to exhibit any significant gearing risk. It should be noted that the damaging impact of the GFC which was substantial for the A-REIT sector has not been explicitly explored in this study and may have exaggerated the negative findings. Whether or not this is the case requires answers from a future programme of research.

The implications for asset allocation strategies is that portfolio managers and other investors who are considering A-REITs may wish to examine the fund's reliance on debt. Additionally, gearing ratios, interest coverage ratios and free cash flow per share provide further information which is valuable in determining financial health and the ability to service debt obligations. Specifically, investors considering funds with negative coverage ratios, low free cash flow and high debt ratios (possibly greater than 40%) should ensure sufficient compensation for the heightened default risk.

7 References

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8 Appendices

	Variable		Mean	Std. Dev.	Min	Max	Observations
Pre-GFC	RETURN	overall	0.0100	0.1303	-1.2281	2.0792	N = 1618
		between		0.0187	-0.0223	0.0532	n = 26
		within		0.1292	-1.1958	2.0360	T-bar = 62.2308
	STOCK	overall	0.0096	0.0314	-0.0882	0.0918	N = 1618
		between		0.0055	0.0057	0.0292	n = 26
		within		0.0312	-0.0910	0.0957	T-bar = 62.2308
	DEBT	overall	0.2650	0.1939	0.0000	0.7890	N = 1618
		between		0.1839	0.0000	0.6961	n = 26
		within		0.1332	-0.0490	0.6787	T-bar = 62.2308
	UI	overall	0.0004	0.0076	-0.0237	0.0260	N = 1618
		between		0.0020	-0.0088	0.0015	n = 26
		within		0.0075	-0.0245	0.0263	T-bar = 62.2308
	DEI	overall	0.0002	0.0017	-0.0091	0.0076	N = 1618
		between		0.0002	0.0000	0.0008	n = 26
		within		0.0017	-0.0089	0.0078	T-bar = 62.2308
	IP	overall	78.3471	4.5726	64.9000	85.7666	N = 1618
		between		2.7696	75.5996	85.6181	n = 26
		within		3.9411	67.5440	88.5141	T-bar = 62.2308
GFC	RETURN	overall	-0.0696	0.1952	-2.1522	0.4424	N = 626
		between		0.2311	-1.2910	0.0024	n = 29
		within		0.1841	-2.0068	0.5509	T-bar = 21.5862
	STOCK	overall	-0.0212	0.0658	-0.1374	0.0869	N = 626
		between		0.0219	-0.1374	-0.0177	n = 29
		within		0.0656	-0.1408	0.1028	T-bar = 21.5862
	DEBT	overall	0.4081	0.2036	0.0000	1.0367	N = 626
		between		0.2182	0.0000	0.8138	n = 29
		within		0.0663	0.0970	0.6310	T-bar = 21.5862
	UI	overall	0.0006	0.0098	-0.0142	0.0146	N = 626
		between		0.0024	-0.0002	0.0098	n = 29
		within		0.0098	-0.0147	0.0152	T-bar = 21.5862
	DEI	overall	-0.0011	0.0037	-0.0115	0.0066	N = 626
		between		0.0019	-0.0096	0.0048	n = 29
		within		0.0037	-0.0116	0.0068	T-bar = 21.5862
	IP	overall	87.2729	1.4220	85.3497	89.5591	N = 626
		between		0.1444	87.1509	87.8254	n = 29
		within		1.4190	85.2892	89.6458	T-bar = 21.5862
Post-GFC	RETURN	overall	0.0017	0.2845	-4.6052	6.2146	N = 3520
		between		0.0368	-0.1591	0.0266	n = 52
		within		0.2836	-4.5121	6.3077	T-bar = 67.6923
	STOCK	overall	0.0048	0.0383	-0.0851	0.1281	N = 3520
		between		0.0026	0.0009	0.0172	n = 52
		within		0.0383	-0.0900	0.1305	T-bar = 67.6923
	DEBT	overall	0.3340	0.1998	0.0000	1.4288	N = 3520

	between		0.1677	0.0000	0.7620	n = 52
	within		0.1303	-0.2108	1.0008	T-bar = 67.6923
UI	overall	0.0015	0.0056	-0.0130	0.0141	N = 3520
	between		0.0010	-0.0006	0.0043	n = 52
	within		0.0056	-0.0157	0.0145	T-bar = 67.6923
DEI	overall	0.0001	0.0016	-0.0060	0.0057	N = 3520
	between		0.0002	-0.0004	0.0008	n = 52
	within		0.001547	-0.00621	0.005741	T-bar = 67.6923
IP	overall	72.00924	42.75451	0	108.3	N = 3520
	between		27.57167	0	96.93527	n = 52
	within		40.48608	-18.1844	163.1552	T-bar = 67.6923

Table 7: Summary statistics for the pre-GFC, GFC and post-GFC periods. Pre-GFC: Observations prior to September 2007. GFC: Observations between September 2007 and August 2009. Post-GFC: Observations after August 2009.