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Investigating the relationship between capital structure and the performance of non-listed real estate funds: focusing specifically on the role of leverage in hedging against inflation

EXECUTIVE SUMMARY

- A panel data regression analysis was undertaken on a unique, unbalanced panel of APAC non-listed real estate funds to determine the role of leverage in hedging against actual and unexpected inflation with a focus on core funds.
- There is evidence that APAC non-listed real estate funds provide hedging against inflation and that the use of debt enhances their hedging capabilities.
- Furthermore, the results show that while leverage enhances a fund's inflation hedging capability at moderate levels, its benefits are not unrestricted.
- The results imply that investors can extract information about inflation hedging abilities of non-listed real estate funds from capital structure data, promoting efficient investment decisions.
- The significance of the results may be influenced by the size of the dataset (119 APAC non-listed real estate funds invested in more than 10 countries across the three styles over the period of 2006-2014).

Background

Over the past fifteen years, the non-listed real estate funds market has witnessed extraordinary growth due to its strengths of combining the flexibility of securitised listed real estate, but without direct exposure to stock market volatility, thereby making it a powerful tool to include in a diversified investment portfolio (Trimailova, 2007). With recent improvements in liquidity and investment scales, this market presents an opportunity for investors to benefit from cross-border real estate investments while bypassing local knowledge barriers. According to ANREV's 2016 Investment Intentions Survey, non-listed real estate funds remain the preferred route to increase real estate allocation for a majority of investors in the Asia Pacific region (ANREV, 2016). However, empirical research has significantly lagged behind the developments in this sector and the performance of nonlisted funds remains under-researched and insufficiently understood (Alcock, Baum, Colley, & Steiner, 2013; Fuerst & Matysiak, 2013). This is mainly attributable to the lack of transparency, consistency, and public disclosure of trading data (Case & Wachter, 2011; Harris, Jenkinson, & Kaplan, 2014). However, in recent years, with the rise of independent associations such as INREV and ANREV focusing on collecting information and developing benchmarks, the sector has witnessed substantial improvements in terms of transparency and accessibility of data. This creates an opportunity to empirically research this sector

in order to enhance our understanding of fund characteristics, performance drivers and risk-return profiles.

Focus & Proposition

This report investigates the relationship between the capital structure and performance of non-listed real estate funds, focusing specifically on the role of leverage in hedging against inflation. This relationship remains significantly under examined, especially in the context of non-listed funds and APAC markets. It examines whether the fundamental inflation hedging quality of real estate (Fama & Schwert, 1977) can be enhanced by the use of debt to finance the real estate assets. This proposition is based on a school of thought initiated by Fisher and Keynes which suggests that in times of high inflation, debt will help hedge the real value of firm equity; as while the value of a firm's assets erode (in real terms), the value of its debt erodes as well (the nominal contracting hypothesis) (Bradford, 1974). Real estate assets act as an ideal candidate to empirically test this theory due to their large debt capacity. This theory predicts that if a real estate asset was to be financed with fixed-rate debt, higher inflation would be beneficial to the real estate owner. This report empirically examines whether this hypothesis applies for non-listed APAC funds, i.e. whether funds holding larger shares of debt tend to have better returns than funds holding smaller amounts during periods of high inflation.

This analysis is based on Alcock and Steiner (2012) that shows that capital structure can be used to implicitly provide unexpected inflation hedging in the context of US equity real estate investment trusts (REITs).

Data Sources

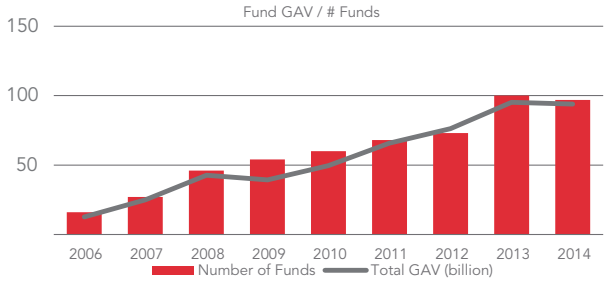
Fund data has been obtained from ANREV. The ANREV database, established in 2011, with fund data back to 2006, is the main source of information on the APAC non-listed fund market. Fund profiles have been provided containing details on the legal structure, fund age, target sector, and geographic focus, as well as financial data.

Note 1: The data has been provided on a confidential basis for use in this research. As for the inflation rates, despite its shortcomings (Arnold & Auer, 2015), the Consumer Price Index (CPI) is regarded as the broadest and most frequently used proxy for actual inflation (Wurtzebach et al., 1991) and therefore is used in this analysis. To ensure consistency, the yearly average CPIs have been obtained from the World Bank database.

Non-Listed Fund Market: Size & Structure

The non-listed fund market has grown substantially over the last decade. Looking at the APAC non-listed funds market, the number of funds tracked in the ANREV database has grown significantly since it started to track funds, increasing from 16 funds at the end of 2006 to 97 in 2014 with a total Gross Asset Value of US$95.2 billion.

(FIGURE 1) ANREV Dataset



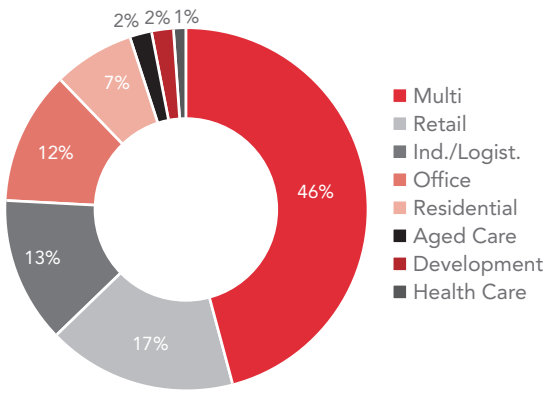
Source: ANREV Database

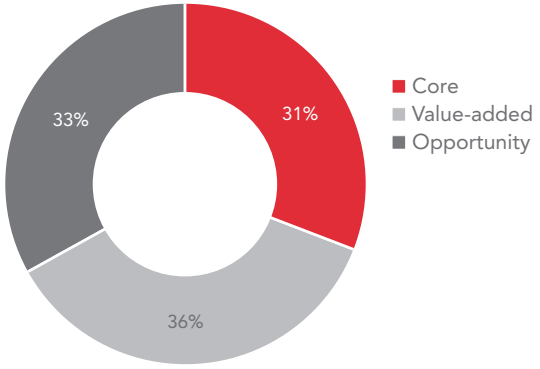
Dataset Composition

The sample analysed consists of an unbalanced panel of 119 APAC non-listed real estate funds invested in more than 10 APAC countries across the three investment styles over the period of 2006-2014. The sample consists of 537 data points, each representing the total annual return and gearing of an individual fund at a different year.

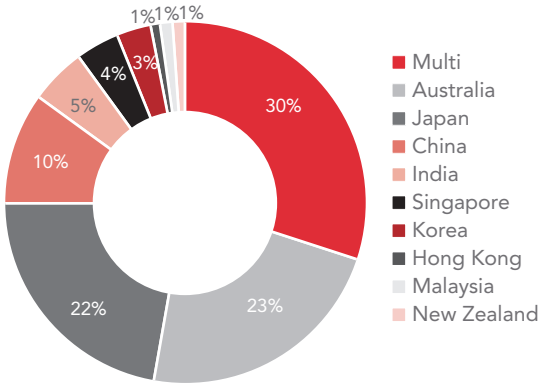
(FIGURE 2) Dataset composition (% Number of funds/total sample)

Funds by Sector





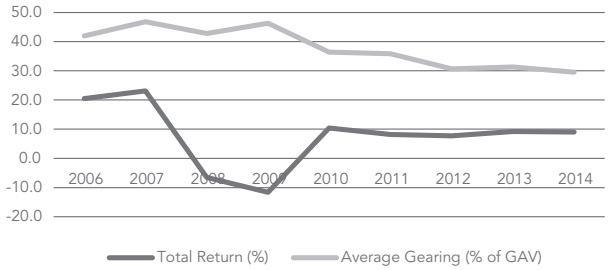
Funds by Country



Multi country and/or multi sector are the dominant fund strategies (by number of funds) with the largest proportion of funds being multi-country and/or multi-sector investors. Retail is the most popular asset class for a single sector fund representing 17% of the sample (by number of funds), with Industrial and Offices at 13% and 12% respectively. As for target countries, Australia and Japan are the largest markets for single country funds, and combined with China, they represent 55% of the sample.

Gearing & Performance: Over Time

(FIGURE 3) Gearing and returns



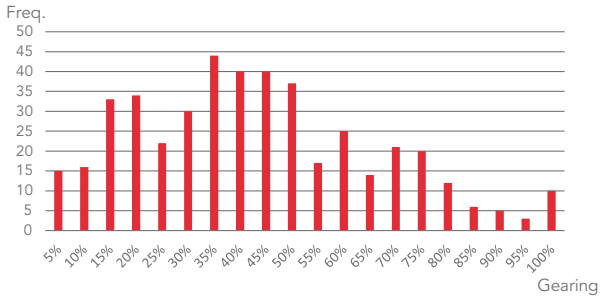
Source: ANREV Database

Note: Total returns is geared

During the immediate aftermath of the financial crisis, the declining property values exacerbated fund leverage levels (ANREV December 2013 Technical Paper by Declan Walsh). However, post-2009, funds have witnessed an extended period of deleveraging, adjusting to the post financial crisis world. As for fund returns, average annual returns have drastically dropped reaching -11.6% in 2009 from the peak of 23%. Following the rebound of the underlying real estate markets in most APAC countries starting 2009, returns improved and stabilised at around 9%.

Gearings & Returns: Descriptive Statistics

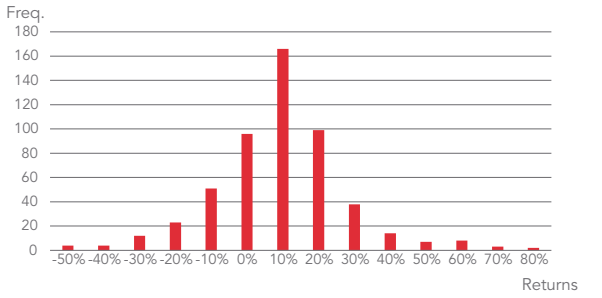
(FIGURE 4) Sample gearing distribution



Mean	Median	SD	Kurtosis	Skewness	Min	Max	Count
34%	33%	26%	-0.58	0.42	0%	100%	537

The sample's mean gearing is 33.75%. There are 93 data points with 0% leverage, the majority of which are closed-ended funds that have fully invested and entered liquidation (loans are paid from sale proceeds after selling portfolio assets). Referring to Exhibit 1, Japanese funds have the highest level of gearing at 60%. Opportunity funds have the lowest average levels of gearing. A possible explanation relates to their greater focus on development activities. According to ANREV (ANREV December 2013 Technical Paper by Declan Walsh), development activities are characterised by varying capital flows throughout a project life, therefore, debt is gradually obtained and its levels vary significantly.

(FIGURE 5) Sample return distribution



Mean	Median	SD	Kurtosis	Skewness	Min	Max	Count
4%	6%	22%	6.87	0.50	-100%	153%	537

Sample returns are more normally distributed. Hong Kong, Malaysia, Singapore and New Zealand funds achieved the highest mean returns (around 17%) while Indian funds had the poorest performance. In terms of style splits, the three types of funds had similar standard deviations, not following the expectation that 'higher risk' Opportunistic funds have larger return variations, however, Opportunistic funds did achieve the highest returns, although they had the lowest average gearing.

Methodology

Protecting wealth against inflation is a key investment objective, particularly for investors with long-term investment horizons where inflation is a primary financial concern (Wurtzebach et al., 1991). Several asset classes have been examined, with the aim to identify which, if any, provide an effective inflation hedge (Fama & Schwert, 1977). The purpose of any hedge is to offset or nullify risk, therefore, an asset's effectiveness in providing inflation hedging is measured by its ability to compensate for the loss in purchasing power resulting from inflation (Wurtzebach et al., 1991).

Panel data regression is used to investigate the relationship between funds' gearing and inflation sensitivities using two alternative definitions of inflation sensitivity. The testing is then repeating focusing only on the unexpected component of inflation, which is estimated using time-series analysis.

This analysis is based on Alcock and Steiner (2012) that shows that capital structure can be used to implicitly provide unexpected inflation hedging in the context of US equity real estate investment trusts (REITs).

Panel Regression (Actual Inflation)

The dataset's two dimensional structure featuring both time-series and cross-sectional characteristics means that it is well suited to a panel data regression. This approach helps address the key OLS regression assumption regarding omitted variables (Startz, 2009). Unobservable country heterogeneity such as differences in the regulatory frameworks and performance of underlying markets are addressed by accounting for country fixed effects. Similarly, time-fixed effects, such as the global financial flows into/out of emerging economies during the period, are also accounted for alongside other fixed effects such as fund, sector, and industry fixed effects.

'Return sensitivity' is a key concept used in this analysis, it is the 'standard approach to evaluating the relationship between investments and inflation' (Case & Wachter, 2011). In terms of its use by the industry, UBS Risk Report (2012;2013) defines inflation sensitivity as an elasticity measure, the 'ratio of basis point change in nominal returns to the basis point change in inflation'. As for academic literature, the traditional methodology is based on Fisher (1930) and Fama and Schwert (1977) in which a static regression is used to obtain an asset's inflation sensitivity, often referred to as the 'Fisher coefficient'. Both definitions are used in testing (Tests A/B), as each provides a set of distinct advantages and limitations.

(EXHIBIT 3) Regression equations

Regression A Base Regression	$S_{(F,T)} = \alpha_{(F,T)} + \beta_1 G_{(F,T)} + \varepsilon_{(F,T)}$ Inflation sensitivity, S, is the dependent variable and fund gearing is the independent variable. β_1, is the coefficient of interest.
Regression B Accounting for Fund Liquidation	$S_{(F,T)} = \alpha(F,T) + \beta_1 G_{(F,T)} + Y_1 D_{LIQ} + \varepsilon_{(F,T)}$ A liquidation dummy is added to mitigate any distortion caused by liquidated funds. This regression is only relevant when using the industry approach. For the Fisher coefficient approach, liquidated funds have been removed from the sample as their influence cannot be isolated (taking the averages of fund performance over the time period).
Regression C Fund Style	$S_{(F,T)} = \alpha_{(F,T)} + \beta_1 G_{(F,T)} + Y_1 D_{LIQ} + Y_2 D_{Style} + \varepsilon_{(F,T)}$ Each style is generally categorised by a different typical risk and return profile. Therefore, the specification is enhanced to account for the structural differences of the funds by introducing style dummies.
Regression D Style – Gearing Interactions	$S_{(F,T)} = \alpha_{(F,T)} + \beta_1 G_{(F,T)} + Y_1 D_{LIQ} + Y_2 D_{Style} + \rho_1 (D_{VA} * G_{(F,T)}) + \rho_2 (D_{VA} * G_{(F,T)}) + \varepsilon_{(F,T)}$ To observe the interactions; the changes in intercept and slope as a result of fund style.
Regression E Fund Size	$S_{(F,T)} = \alpha_{(F,T)} + \beta_1 G_{(F,T)} + Y_1 D_{LIQ} + Y_2 D_{Style} + \rho_1 (D_{VA} * G_{(F,T)}) + \rho_2 (D_{VA} * G_{(F,T)}) + \beta_2 (ln(NAV)) + \varepsilon_{(F,T)}$ Size impacts both a fund's ability to obtain leverage (Geltner & Miller, 2002) and its performance (Fuerst & Matysiak, 2013). Therefore, fund size must be accounted for. Fund NAV (net asset value) has been transformed using its natural logarithm to adjust the right skew observed.
Regression F/G/H Accounting for Country / Style / Year Fixed Effects	$S_{(F,T)} = \alpha_{(F,T)} + \beta_1 G_{(F,T)} + Y_1 D_{LIQ} + Y_2 D_{Style} + \rho_1 (D_{VA} * G_{(F,T)}) + \rho_2 (D_{VA} * G_{(F,T)}) + \beta_2 (ln(NAV)) + Y_3 D_{countries} + Y_4 D_{sectors} + Y_5 D_{years} + \varepsilon_{(F,T)}$ Dummy variables are added to control for fixed effects. Regression H (year fixed effects) is only relevant when using the industry approach. The Fisher coefficient approach uses averages per fund and therefore all years are compressed into one data-point/ fund.

Panel Regression (Unexpected Inflation)

Time series analysis is used to decompose the actual rate of inflation (CPI) of each country into its expected and unexpected components using the following models.

(EXHIBIT 4) ARIMA models specifications

Country	ARIMA Specification	Period
Australia	ARIMA (1,1,3)	Quarterly 1991 - 2015
China	ARIMA (1,1,2)	Monthly 2001 - 2015
Hong Kong	ARIMA (1,1,2)	Monthly 2000 - 2015
India	ARIMA (2,1,1)	Monthly 2002 - 2015
Japan	ARIMA (1,2,0)	Monthly 2005 - 2015
Korea	ARIMA (1,1,2)x(1,0,0)12	Monthly 2006 - 2014
Malaysia	ARIMA (2,1,2)	Quarterly 1980 - 2014
New Zealand	ARIMA (4,0,2)	Quarterly 2006 - 2015
Singapore	ARIMA (2,0,2)	Quarterly 1980 - 2014

(EXHIBIT 5) Unexpected inflation estimations`

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014
Australia	0.25	-0.09	0.37	-0.41	0.17	0.14	-0.29	0.07	-0.21
China	0.02	-0.32	-0.03	0.50	-0.32	-0.19	0.26	-0.03	0.07
Hong Kong	0.02	-0.32	-0.03	0.50	-0.32	-0.19	0.26	-0.03	0.07
India	0.09	-0.06	0.43	0.23	-0.35	0.05	0.27	0.05	-0.57
Japan	-0.07	-0.04	0.02	0.03	-0.06	0.10	-0.03	-0.01	0.04
Korea	-0.33	0.11	0.36	-0.10	-0.02	0.08	-0.09	-0.48	0.06
Malaysia	0.92	-1.88	1.31	-2.27	-0.61	1.34	0.33	0.48	-0.38
New Zealand	-0.29	0.29	-0.19	-0.14	0.54	-0.52	-0.05	0.18	-0.12
Singapore	0.43	-0.31	0.03	-0.37	-1.20	1.16	1.00	0.63	1.06

As seen in Exhibit 5, generally, countries in the sample have experienced low unexpected inflation during the period 2006-2014. This is not surprising as the study period coincides with the financial crisis in which most APAC economies experienced low inflation/deflation for extended periods of time. Using the estimated unexpected components of inflation, the unexpected inflation sensitivity of each fund is obtained using the Fisher coefficient methodology highlighted in Test 2B. The unexpected inflation sensitivity of each fund is then used in regressions A-G to investigate whether leverage enhances the funds' ability to hedge against unexpected inflation.

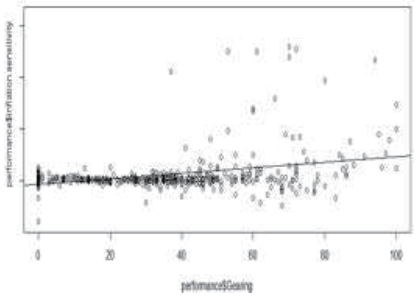
Results

Using the first definition of inflation sensitivity. The line of best fit as seen in Figure 8 indicates the existence of a positive relationship between gearing and the inflation sensitivities of the funds. Exhibit 8, presents the regression results for specifications (A) to (H) over the full study period. Calculating the ratio of change in return to the change in inflation, 418 data points remain in the sample and are analysed. Robust standard errors are clustered by fund.

The base regression (A) only explains 10% of the variation in inflation sensitivity. As expected, the model is significantly enhanced when accounting for the other variables, especially, year and country fixed effects, which are both significant. The model indicates that a small number of factors explain a reasonable proportion of a fund's inflation sensitivity.

Looking at gearing, in line with the theory and expectations, gearing appears to have a highly significant contribution to the inflation sensitivity of a fund; a percentage point increase in gearing causes a 0.45 to 0.92 percent increase in inflation sensitivity. While a number of previous papers have found that the use of debt reduces the nominal returns of non-listed funds (Alcock et al., 2013; Fuerst and Matysiak, 2013), the results above suggest that accounting for inflation, leverage has a significant effect on enhancing the inflation sensitivities of non-listed funds. The gearing-style interaction coefficients are significant and indicate that the marginal impact of gearing on inflation sensitivities is influenced by the type of fund. Core funds experience the strongest marginal impact of gearing, followed by Value-added and finally Opportunistic funds. Given the large variability in opportunistic funds' gearings, it is more appropriate to focus specifically on core funds in this investigation.

(FIGURE 8) Test 2A scatterplot



(EXHIBIT 8) Test 2A regression results

Variable	Reg A Naïve	Reg B Liquid.	Reg C Style	Reg D Sty*G	Reg E Fund Size	Reg F Sector FE	Reg G Year FE	Reg H Country
Intercept	-4.58 (-1.29)	-9.71 ** (-2.06)	-4.95 (-0.94)	-14.58 ** (-2.25)	-63.78 (-1.61)	-64.65 (-1.45)	-38.14 (-0.91)	-67.12 (-1.64)
Gearing	0.45 *** (5.51)	0.55 *** (5.50)	0.59 *** (5.75)	0.88 *** (5.56)	0.92 *** (5.77)	0.88 *** (5.51)	0.89 *** (5.69)	0.54 *** (2.98)
Liquidation	–	10.44 (1.55)	15.69 ** (2.22)	6.67 (0.86)	9.03 (1.14)	8.73 (1.07)	11.08 (1.47)	3.55 (0.46)
VA	–	–	-6.85 (-1.27)	4.05 (0.43)	9.12 (0.89)	7.63 (0.70)	8.91 (0.86)	6.52 (0.66)
Opp	–	–	-11.88 ** (-2.12)	9.92 (1.05)	14.87 (1.46)	11.47 (1.03)	16.15 (1.53)	11.51 (1.06)
Gear * VA	–	–	–	-0.30 (-1.44)	-0.36 * (-1.68)	-0.33 (-1.52)	-0.34 * (-1.65)	-0.40 ** (-2.07)
Gear * Opp	–	–	–	-0.65 *** (-2.81)	-0.72 *** (-3.06)	-0.70 *** (-2.88)	-0.77 *** (-3.36)	-0.63 *** (-2.79)
log(NAV)	–	–	–	–	2.29 (1.26)	2.23 (1.17)	3.41 * (1.90)	3.80 ** (2.19)
Sector Fixed Effects	No	No	No	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No	No	Yes	Yes
Country Fixed Effects	No	No	No	No	No	No	No	Yes
R Squared	10%	11%	12%	14%	16%	18%	36%	44%

Sig: * 10%, ** 5%, *** 1%

As for the alternative method, Exhibit 9 shows the results obtained from regressions A-H using the Fisher coefficients instead of the UBS definition of inflation sensitivity. As can be seen, the results are less conclusive than those of Test A (Exhibit 8). Nevertheless, a statistically significant small positive relationship does exist in regressions A to E. Once sector and country fixed effects (regressions F and G) are accounted for, the significance of gearing is absorbed. It is important to note that due to the limited sample size and short life-span of some funds, this approach significantly reduces the number of data-points analysed to 106 points. Overall, the results provide support for the key finding obtained previously which is that leverage enhances a fund's inflation sensitivity.

Panel Regression (Unexpected Inflation)

Establishing that a significant relationship between gearing and a fund's ability to hedge against actual inflation (CPI) empirically exists, the focus is shifted to the unexpected component of inflation.

As highlighted in Exhibit 10, testing the unexpected inflation sensitivities of funds against gearing provides the least conclusive results i.e. a statistically insignificant positive relationship. Although the model is statistically weak, it is still worthwhile to notice the positive (albeit insignificant) relationship. Referring to the inflation hedging theory and literature, the general consensus is that while real estate investments generally provide a partial hedge against actual and expected inflation, they do not hedge against unexpected inflation (Gyourko and Linneman, 1988; Yobaccio et al., 1995; Hoesli et al., 2008). The explanation stems from the typical lease structure of European and American commercial real estate deals in which the lease period is usually 5 years or more (Huang & Hudson-Wilson, 2007; Le Moigne & Viveiros, 2008). Once a lease contract is set, the equilibrium expected rate of inflation is accounted for in rent (Hoesli et al., 2008). Nevertheless, in the case of inflationary shocks, rent response lags until the next rent review occurs. Although it is true that in the case of real estate funds, income smoothing occurs as funds tend to own multiple properties, each with a different starting and ending lease date. Nevertheless, a lag will ultimately exist between an inflationary shock and a funds rental income response. On the other hand, the 'typical' lease structure in many APAC commercial real estate markets is different to that of Europe and the USA. In many APAC markets, rent review periods are typically shorter and therefore, rent tends to reflect unexpected inflationary shocks more readily. According to Savills 2015 H1 Asia-Pacific Investment Guide, the typical lease term for commercial properties in China, Hong Kong, Japan, Malaysia, Singapore, and South Korea is between 2-3 Years (Australia is the only exception with typical lease terms between 3-5 years). Overall, the findings for unexpected component of inflation provide

(EXHIBIT 10) Test 3 regression results

Variable	Reg A Naïve	Reg C Style	Reg D Sty*G	Reg E Fund Size	Reg F Sector FE	Reg H Country
Intercept	-15.12 (-0.67)	-6.34 (-0.25)	-12.28 (-0.36)	110.7 (0.44)	156.11 (0.58)	143.80 (0.48)
Gearing	0.33 (0.665)	0.46 (0.883)	0.62 (0.75)	0.49 (0.557)	0.68 (0.75)	1.76 (1.27)
VA		-27.86 (-1.139)	-5.18 (-0.10)	-18.80 (-0.31)	-12.80 (-0.20)	-1.86 (-0.30)
Opp		-10.05 (-0.38)	-18.90 (-0.32)	-36.20 (-0.53)	0.51 (0.01)	35.50 (0.36)
Gear * VA			-0.54 (-0.46)	-0.36 (-0.29)	-0.57 (-0.46)	-0.71 (-0.52)
Gear * Opp			0.22 (0.16)	0.55 (0.35)	-0.36 (-0.20)	-0.71 (-0.64)
log(NAV)				-5.66 (-0.49)	-8.01 (0.68)	-7.00 (-0.52)
Sector Fixed Effects	No	No	No	No	Yes	Yes
Country Fixed Effects	No	No	No	No	No	Yes
R Squared	1%	1%	4%	4%	11%	16%

Sig: * 10%, ** 5%, *** 1%

an inconclusive indication that APAC non-listed funds can potentially hedge against unexpected inflation, and that this ability is enhanced with the use leverage. It is worth noting that this possible explanation relies on the 'typical' lease structure in many APAC commercial property markets, however, this is not to say all APAC commercial leases are of shorter periods compared to Europe and the US; as one would expect, APAC commercial leases are varied and heterogeneous.

Results & Findings

To conclude, the hypothesis is tested on a unique, unbalanced panel of 119 APAC, non-listed real estate funds invested in more than 10 countries across the three investment styles over the period 2006-2014. The findings are largely in line with what theory predicts. The results show that non-listed real estate funds provide inflation hedging, and that the use of debt enhances their inflation hedging capabilities. (Note)

However, testing against the unexpected component of actual inflation separately, the results indicate a positive, yet statistically insignificant relationship.

The findings are explained by referring to the characteristics of the APAC commercial real estate market, and in specific, the market's typical lease structure (short lease terms) and debt financing characteristics. In theory, both these characteristics enhance the inflation hedging quality of real estate assets.

Conclusions & Practical Implications

Inflation is one major concern for real estate investors, especially those with long-term investment horizons, such as insurance firms or pension funds (Glascock, Lu, & So, 2002). Therefore, the existence of such a relationship between debt and inflation hedging in practice makes this resulting 'inflation-reversing' effect attractive for such investors, to the point that inflation could become a positive risk factor in the levered equity (Geltner & Miller, 2002).

Similar to other studies looking at this relationship in different contexts (Alcock & Steiner, 2012), the results from this investigation imply that investors can extract information about the inflation hedging abilities of non listed funds from their capital structure data.

Note: The funds in the ANREV database that are covered by this analysis represent a large part of the universe, however funds that were liquidated during the GFC are not captured by this survey.

Investors might find non-listed funds to be an attractive means of accessing the growing APAC real estate markets. Inflation hedging is a major issue, especially in the context of growing concerns regarding the impact of the post financial crisis quantitative easing policies on inflation in Asia. The findings imply that insights regarding the inflation hedging abilities of individual non-listed funds can be gained by looking at their capital structure data, thereby encouraging more efficient investment decisions.

It is important to point out that the results presented here give only a partial picture of the impact of gearing on inflation sensitivity, primarily due to limited data availability. Whilst the sample examined is larger than the samples tested in the few other papers examining APAC markets, it is still relatively small in comparison to the samples used to investigate the more mature European markets. The sample consists of a large number of young funds, most with a short history of available information and this reduces strength of the statistical analysis.

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