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Predictability of Equity REIT Returns: Implications for Property Tactical Asset Allocation

John Okunev
Managing Director, Global Alpha Portfolio Management Pty Ltd., 10 Arnold St, Queens Park, Sydney, 2022, Australia; Tel: +61266744575: E-mail: john.okunev@gmail.com

Patrick J. Wilson
School of Finance and Economics, University of Technology, Sydney, Australia; Tel: 61295142000; Email: Patrick.Wilson@uts.edu.au

This study presents further evidence of the predictability of excess equity REIT (real estate investment trust) returns. Recent evidence on forecasting excess returns using fundamental variables has resulted in diminishing returns from the 1990's onward. Trading strategies based on these forecasts have not significantly outperformed the buy/hold strategy of the 1990's. We have developed an alternative strategy that is based on the time variation of the risk premium of investors. Our results indicate that it is possible to outperform the buy/hold strategy by modeling the time variation of the risk premium. By modeling the dynamic behavior of the risk premium, we are able to implicitly capture economic risk premiums that are not captured by conventional multi beta asset pricing models.

Keywords

Equity REIT; Predictability; Risk premium

1. Introduction

There has been substantial interest among both practitioners and academics in recent years in modeling the predictability of asset returns. Practitioners are interested in being able to predict asset returns as this will directly influence their trading strategies. Academics are also interested in this area as it has important implications in the development of asset pricing models. Evidence from the literature suggests that investment strategies based on forecasts of excess returns from fundamental variables have produced positive excess returns in the 1970's and 1980's. However, the performance of these models in the 1990's has been disappointing. This paper adopts an alternative approach and develops strategies based on the time variation of the *ex ante* risk premium. It begins with a review of the literature on the predictability of asset returns, moves on to a discussion of the methodology used, presents the outcomes from the analysis, and ends with some conclusions.

2. Literature Review

Historically, two approaches have been used in predicting asset returns, viz., the fundamental approach and, secondly, modeling investors' perceptions of risk through the use of time varying risk premiums. The fundamental approach relies on the assumption that asset returns are influenced by some common factors that reflect different stages of the business cycle. Studies that have adopted this approach in relation to stock markets include Chen et al (1986), Conrad and Kaul (1988), Fama and French (1990, 1993), Ferson and Harvey (1991), Lo and Mackinley (1992), and others. Similar methodologies have been applied to real estate markets. For example, studies on the real estate market by Liu and Mei (1992), Liu and Mei (1994), Ling and Naranjo (1997), Liu and Mei (1998), Karolyi and Sanders (1998), Quan and Titman (1999), and Ling, Naranjo and Ryngaert (2000) have found that economic factors conventionally considered important in predicting excess stock returns were also important in predicting excess real estate returns.

Variables that were found to be important were the yield on one month treasury bills, the yield spread between AAA bond and treasury bills, the dividend yield of the stock market, and the cap rate. For the period 1972-1989, Liu and Mei (1992) found the excess returns of the equity REITS over the treasury bill rate were predictable with R-squares ranging from 14.6% to 16.6%. In a follow-up paper, Liu and Mei (1994) demonstrated that significant profits could be generated by forecasting excess returns based on the variables described above.

When the excess return was forecast to be positive, a long position was taken in the equity REITS. When the forecasted risk premium was negative, a short position was taken. This long/short strategy produced significant profits in and out of sample on both a non-risk adjusted and a risk adjusted basis. There is also research showing that REIT returns are no more predictable than returns on conventional equities. For instance, Li and Wang (1995), using a multifactor asset pricing model that included the inflation rate, the growth of industrial production, the term spread, and that allowed for time-varying risk premiums, could find no evidence that REIT returns were more predictable than the returns of other stocks over the period 1971-1991.

Ling and Naranjo (1997) similarly found evidence to support a commonality of some "drivers" for both the real estate and stock markets. They used nonlinear multivariate techniques to jointly estimate the risk factor sensitivities and return premiums that economic variables such as treasury bills, industrial production, per capita consumption, expected and unexpected inflation, etc., had on commercial real estate returns. Their analysis was applied to both securitized real estate data as well as to "unsmoothed" real estate data from the National Council of Real Estate Investment Fiduciaries. Their study showed that the growth rate in real per capita consumption and the real treasury bill rate were important economic variables (i.e., consistently priced across the four real estate portfolio groups constructed), while the term structure and unexpected inflation did not carry statistically significant risk premiums in their fixed-coefficient model.

Nelling and Gyourko (1998) studied the predictability of equity REIT returns over the period 1975-1995 and found that equity REIT returns were predictable based on past performance, but that the predictability was insufficient to cover transaction costs. Karolyi and Sanders (1998) examined the variation of economic risk premiums by employing a multiple beta asset pricing model and found varying degrees of predictability among stocks, bonds, and REITS, concluding that there were important economic risk premiums for REITS that were not captured by conventional multiple beta asset pricing models. Using a different approach, Cooper et al (2000) examined the relationship between systematic price changes and the heterogeneity of investor information. They employed a filter-rule methodology to determine predictability in returns and found that the predictability of real estate returns was generally more indicative of portfolio rebalancing effects.

In a later study on asymmetric risk measures and real estate returns, Cheng (2005) examined six asymmetric risk measures and tested their ability to explain cross-sectional variations in real estate returns. He found that systematic downside risk was associated with a risk premium and that skewness, or the lack of statistical symmetry, provided significant explanatory power for the variation of cross sectional property returns.

In a comparative study on international real estate and stock markets, Liu and Mei (1998) found that own country economic state variables (short-interest rates, spread between long and short rates, dividend yield), when the exchange rate was adjusted for US dollars, accounted for a portion of the variation in the expected rates of return in some countries, but not in others. Ling et al (2000) have shown that the extent of the predictability of the risk premium was not nearly as great in the 1990's compared to the 1970's and 1980's. Using a rolling best fit regression model, they were able to produce fairly high results in sample R-squares, but out of sample fits were quite low.

With plausible levels of transaction costs, they showed that trading strategies based on forecasted risk premiums did not outperform the buy/hold equity REIT strategy in the 1990's.

Recent evidence appears to indicate that forecasting the risk premium based on fundamental variables does not perform as well as it did during the 1970's and 1980's. In this paper we adopt a different approach and model the dynamic behavior of the *ex ante* risk premium. From a simple discounted dividend model we extract the *ex ante* risk premium implied from equity REITS. Using this series, we observe that when the normalized risk premium is high, this is usually associated with an undervaluation of equity REITS.

Conversely, when the normalized risk premium is low, this is usually associated with overvalued equity REITS. Our results indicate that when a strategy is based on modeling the *ex ante* normalized risk premium, it is able to significantly outperform the buy/hold strategy. By modeling the dynamic behavior of the *ex ante* risk premium, we are implicitly capturing other economic risk premiums that are not captured by conventional multi beta asset pricing models (Karolyi and Sanders, 1998).

3. Data, Methodology and Empirical Results

The study period is from January 1972 to December 2003. All equity REIT data were obtained from the National Association of Real Estate Investment Trusts data library. We note that there are some differences in the number of constituents making up the index each year. The yield on treasury bills, the yield on 20 year government bonds, and the yield on the Standard &Poor's 500 were obtained from data available on DataStream International, which is licensed annually to the School of Finance and Economics at the University of Technology, Sydney, Australia.

3.1. Descriptive Statistics

Table 1 presents descriptive statistics of the data utilized throughout this paper, consisting of total monthly returns (including capital gains and dividends paid) from equity REITS, the yield on treasury bills, the yield on 20 year government bonds, and the annualized realized risk premium for the equity REITS, which is defined as the equity REIT's total monthly return minus the yield of treasury bills).

Prior studies have raised the issue of a potential structural break in equity REITs. We examine this issue by conducting a Zivot and Andrews (1992) test for structural breaks. The benefits of using this test are that it reports values for which potential breaks occur when they are neither specified nor determined. The importance of highlighting where a structural break may occur in the data is that it can have a fundamental impact on one of the major test statistics, which will be examined in the empirical section. Simply put, if no consideration is made for structural breaks, linear regression may produce spurious results as parameter stability becomes questionable over the whole sample period or periods straddling the structural break.

Table 1 Descriptive Statistics between January 1972 and December 2003

384 Observations	Equity REITS	Treasury Bill Yield	Twenty Year Bond Yield	Realized Risk Premium
Annualized Mean %	12.7	6.3	8.2	6.4
Annualized Std. Dev. %	13.5	2.9	2.3	13.6

The results of the Zivot and Andrews (1992) test indicate a significant structural break for equity REITS occurring at about August 1989. In a recent paper, Glascock et al (2000) found evidence of a structural break in 1993, arguing that this might be due to changes in tax legislation. We applied the Zivot and Andrews (1992) test to the data from 1990 to 2003 and found no evidence of this additional structural break at that time. We therefore proceeded on the basis that only one break occurred and this was in August 1989. We therefore partitioned the data set into two sub-samples, sub-sample one being from January 1972 to August 1989 and sub-sample two from September 1989 to December 2003.

The question naturally arises as to what economic event or events may have led to the structural break in August 1989, and we suggest two possible reasons from the literature. Goetzmann and Wachter (1996), Quan and Titman (1999), and Case et al (1999) have provided compelling evidence that real estate returns are highly correlated with changes in global and domestic Gross Domestic Products (GDP) and that the negative returns of real estate markets in the early 1990's was due to a global recession in 1990. This is especially the case in the United States, where both global and local economic factors are important in explaining movements in real estate returns (Case et al, 1999). This event may also have been exacerbated by the savings and loan crisis, which occurred in 1989 and which resulted in a dramatic shift in the financing of real assets.

From the Gordon Shapiro discounted dividend model we extract the implied *ex ante* risk premium from the following equation.

$$P(t) = \frac{D(t)(1+g)}{(R(t)-g)} \tag{1}$$

where $D(t)$ are dividends paid at time t
g is the long term annualized growth rate of dividends;
$R(t)$ is the cost of capital/required rate of return at time t;
$P(t)$ is the equity REIT price index at time t.

The required rate of return, *R(t),* represents the market's estimate of the return required by investors for holding a risky asset. This is a forward-looking estimate and may be quite different to past (realized) returns. The *ex ante* risk premium is defined as, $EARP(t) = R(t) - TB(t)$ and represents the excess return/risk premium over treasury bills. The *ex post* risk premium is defined as $EPRP(t) = R12(t) – TB(t)$, in which $R12(t)$ is the previous 12 month total return of the equity REITS, and $TB(t)$ is the treasury bill rate at time *t*.

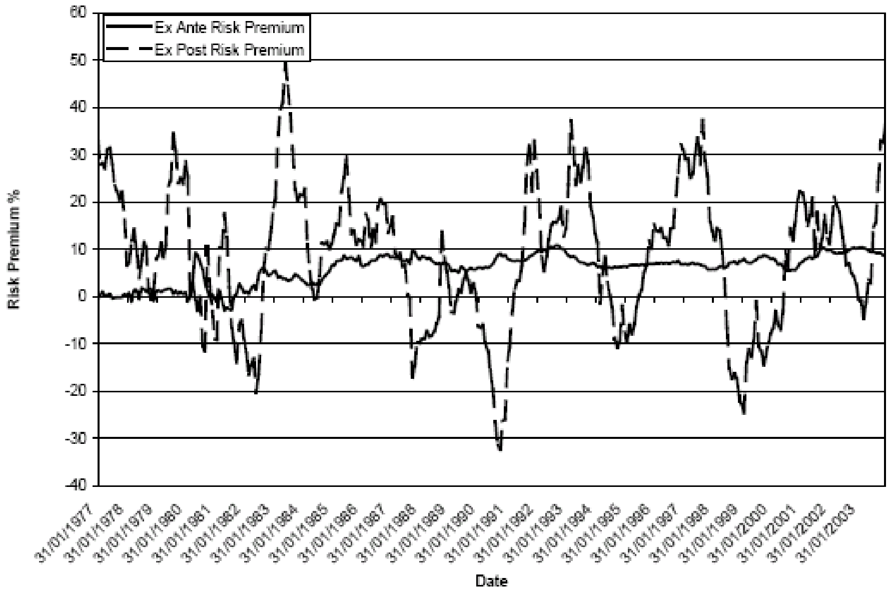
The Gordon Shapiro model requires an estimate of the long-term growth rate of dividends. We present two approaches. The first is to use all the data from 1972 to 2003 and regress the dividend index against time. The slope of this regression is an estimate of the long-term growth rate, which in this case was 4.4% per annum. One could argue that although *g* is constant as required by the Gordon Shapiro model, one could be criticized for introducing a look-ahead bias into the estimates of the required rate of return. For example, in estimating the required rate of return in December 1989, investor estimates of the growth rate could only use information available at that time. As more information becomes available, the estimate of the growth rate may change. To overcome this potential problem, we also estimate the growth rate using information only up to time *t*. This means that as more information becomes available, estimates of the growth rate may change. We will examine this issue further later in the paper.

It is apparent that the *ex ante* risk premium is mostly positive and is not nearly as volatile as the *ex post* risk premium. Also note that the *ex ante* risk premium is negative in 1977 and 1981.

The *ex ante* risk premium is calculated using equation 1 and information that was available at time *t*. Figure 1 displays the *ex ante* risk premium from January 1977 to December 2003. It is apparent that the *ex ante* risk premium is mostly positive and is not nearly as volatile as the *ex post* risk premium. It is also interesting to note that the *ex ante* risk premium was negative in 1977 and 1981. These results lent some support to the findings of Boudoukh et al (1993) that developed tests of inequality restrictions implied by conditional asset pricing models. As an application, they tested whether the *ex ante* risk premium was always positive. Using annual data on aggregate US stock returns, inflation, long and short rates of interest, and dividend yields over three time periods (1802-1990, 1802-1896, and 1897-1990), they reported reliable evidence that the *ex ante* risk premium was negative in some parts of the world, with these places being related to periods of high expected inflation and especially to a downward sloping term structure. For the period April to August 1981, the yield curve was inverted and inflation varied between 8% and 13%. For 1977, the yield curve was not inverted, and inflation was 7% per annum.

Liu and Mei (1992), Mei and Liu (1994), Karolyi and Sanders (1998), and Ling et al (2000) have shown that variables such as the treasury bill rate, the spread between the yields on long term bonds and treasury bills, the dividend yield of the equity market and cap rate at time *t* are able to explain between 20% and 30% of the variation in the realized risk premium from *t* to *t+1*. The realized risk premium is defined as the monthly return of the equity REITS from *t* to *t+1* minus the treasury bill rate at time *t*. It therefore seems sensible to determine whether these same variables can forecast the *ex ante* risk premium. We adopt an approach which is similar to Liu and Mei (1992), where the *ex ante* risk premium at time *t+1* is regressed against the following variables: January dummy, treasury bill rate, spread between the yield on a long bond and the treasury bill, the dividend yield of equity REITs, and the earnings yield of the SP500 at time *t*. The sample is divided in two. The first sub-sample is the in sample period from January 1972 to August 1989; the second sub-sample is the out of sample from September 1989 to December 2003.

Figure 1 Ex post and Ex ante Risk Premium over Treasury Bills



The results of the regressions are presented in Table 2. We use generalized least squares regression as there was some evidence of serial correlation in the residuals. It is evident that fundamental factors cannot explain many of the future movements in the *ex ante* risk premium in either of the sample periods. These results are in stark contrast with prior research, which found that fundamental factors explain much the movement of the realized risk premium. It appears that movements of the *ex ante* risk premium are not driven by these fundamental factors but are capturing some other factors which are influencing equity REIT price movements.

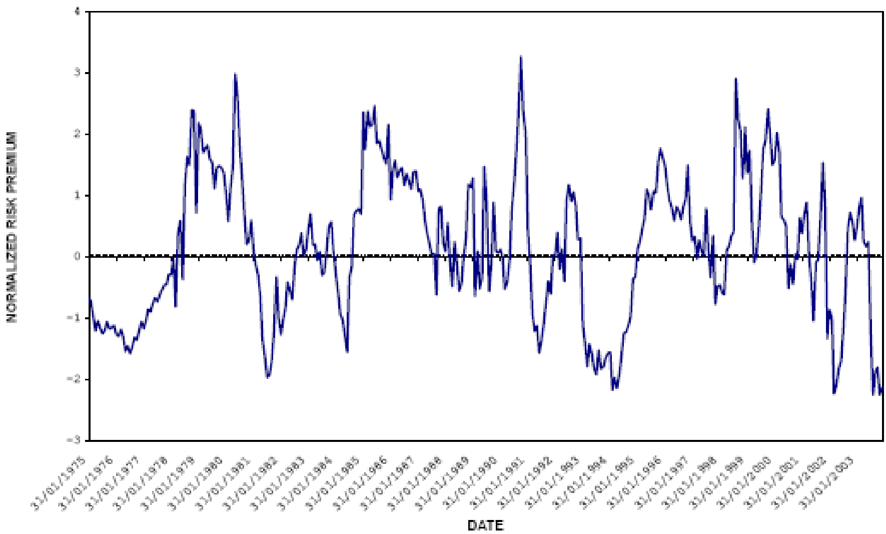
We now investigate whether the dynamic behavior of the *ex ante* risk premium contains information about likely price movements of the equity REITS in the future. Figure 2 displays the 36 month rolling normalized *ex ante* risk premium calculated from the implied growth approach (that is, using information up to time *t*) relative to treasury bills from January 1977 to December 2003. We suggest that when the normalized risk premium is high relative to the historic average, investors will demand a greater return in holding a risky asset. This is usually associated with falling prices. Similarly, when the normalized risk premium is low relative to the historic average, investors require a lower return for holding risky assets. This is usually associated with rising prices.

Table 2 Results of the Ex *ante R*isk Premium (EARP) against Fundamental Factors Using Generalized Least Squares

EARP (t+1) = a+bJandum(t)+cTB(t)+dSP(t)+DY(t)+fEY9t_+e(t)

Depen-dent Var.	Period	Con-stant	Jan dum	TB	SP	DY	EY	adj R^2
EARP	1/74-8/89	-062 (-1.58)	-0.001 (-0.48)	-0.0014 (-0.78)	-.001 (-0.58)	-.006 (-0.86)	0.03 (2.10)	0.0006
EARP	9/89-12/03	0.065 (0.45)	-0.001 (-0.12)	0.001 (0.46)	.002 (1.33)	-.0002 (-0.04)	-0.001 (-0.39)	0.0003

Figure 2 Normalized Ex ante Risk Premium



Observation of Figure 2 would suggest that in 1980, 1985, 1987, 1992, 1995, 1999, and 2001, the equity REITS were oversold (prices depressed) and that the market was overbought in 1977, 1990, 2002, and 2003 (prices inflated). Figure 2 also demonstrates that the normalized risk premium is mean reverting and generally oscillates between ±2 standard deviations. Large values are usually associated with reversals in the next three to six months.

To obtain some insight into the likely future performance of equity REITS, we examine the returns when the *ex ante* risk premium is greater and less than zero. The *ex ante* risk premium can be calculated either by subtracting the treasury bill rate from the implied cost of capital or by subtracting the yield on 20 year government bonds from the cost of capital. We examine both approaches in the following discussion.

Table 3b displays the average return and standard deviation of a number of strategies. The strategies examined follow two approaches, each of which is sub-divided into another two segments. The two approaches are 1.) the *ex ante* risk premiums calculated from the implied growth model using information up to time *t* and 2.) the constant growth model, which uses all information to estimate the *ex ante* risk premiums. The *ex ante* risk premiums are then measured relative to long bonds and then to *s*. Specifically, from the implied growth model we have two estimates of the *ex ante* risk premium, one relative to long bonds (IMGRPLB), the other relative to *s* (IMGRPTB). Similarly, for the constant growth model we have the *ex ante* risk premium relative to long bonds (CGRPLB) and to s (CGRPTB).

It is evident from Table 3b that when the *ex ante* risk premium was greater than zero, the ensuing average return was in the 18% to 19.4% per annum range over the entire sample. The returns in the first sub-period were more than 22% per annum, while in the second sub-period, returns were in the 13.5% to 17.3% per annum range. On the other hand, when the *ex ante* risk premium was less than zero, the ensuing average return was in the range of 2.2% to 4.8% per annum over the entire sample. These results confirm our initial assumption that high-risk premiums are usually associated with higher subsequent returns, and lower risk premiums with lower subsequent returns.

Though there are some differences in returns for the different approaches in estimating the *ex ante* risk premium, these differences are not great. Possibly the most effective approach in estimating the *ex ante* risk premium is using the implied growth model relative to s. The question then arises as to how one should invest when the *ex ante* risk premium is less than zero.

Table 4 presents excess returns measured relative to a buy/hold equity REIT benchmark for the approaches outlined in table 3. This table presents average excess returns (return of the strategy – the equity REIT return) and the standard deviation of the excess return. The third row of Table 4 presents the *t*-values. We also compare these results to a forecasting model and show that the performance of the forecasting model has produced lower returns than the buy/hold strategies since 1990. Using an approach similar to other researchers, we perform a rolling 60 month regression of the realized excess return of the equity REITS from *t* to *t+1* on a lagged variable at time *t*. The lagged variable we adopt is the dividend yield of the equity REITS minus the yield on the 20 year government bond.

Table 3a Acronyms Used in Tables 3b and 4

Acronym	Meaning
IMGRPLB	Implied Growth Risk Premium Relative to Long Bonds
IMGRPTB	Implied Growth Risk Premium Relative to Treasury Bills
CGRPLB	Constant Growth Risk Premium Relative to Long Bonds
CGRPTB	Constant Growth Risk Premium Relative to Treasury Bills
FRP	Forecast Risk Premium

Table 3b Normalized E*x ante R*isk Premium and Returns of Equity REITS

Normalized Risk Premium ≥ 0	**1/80- 8/89**	**9/89 – 12/03**	**1/80 – 12/03**
Implied Growth RP relative to Bonds (IMGRPLB)	22.2 (12.5)	15.2 (12.8)	18.3 (12.5)
Implied Growth RP relative to Tbills (IMGRPTB)	22.3 (10.7)	17.3 (12.4)	19.4 (11.7)
Constant Growth RP relative to Bonds (CGRPLB)	25.4 (9.5)	13.5 (12.7)	18.0 (11.7)
Constant Growth RP relative to Tbills (CGRPTB)	22.4 (10.0)	16.8 (13.1)	19.2 (13.1)
Normalized Risk Premium < 0			
Implied Growth RP relative to Bonds (IMGRPLB)	-0.1 (12.0)	7.0 (12.1)	4.5 (12.0)
Implied Growth RP relative to Tbills (IMGRPTB)	1.4 (14.2)	2.7 (12.3)	2.2 (13.0)
Constant Growth RP relative to Bonds (CGRPLB)	0.0 (14.5)	8.5 (12.3)	4.8 (13.3)
Constant Growth RP relative to Tbills (CGRPTB)	2.5 (14.9)	5.4 (11.5)	4.3 (12.8)

Over the whole sample period, all strategies outperformed the buy/hold strategy at the 10% level of significance. Using the implied growth measures of the *ex ante* risk premium produced significant excess returns at the 2.5% level of significance. For the first sub-period, both the implied growth measures of the *ex ante* risk premium and the forecasting strategy produced significant excess returns at the 10% level. The constant growth *ex ante* risk premium strategies produced similar excess returns to the implied growth strategies. However, the volatility was higher and consequently the *t*-values were lower. For the second sub-period, the only strategy to produce significant excess returns was the implied growth strategy, where the *ex ante* risk premium was measured relative to *s*. Similar to the findings of Ling et al (2000), we found that the forecasting strategy which invested in cash/bonds and equity REITS underperformed the buy/hold strategy in the 1990's. It should be noted, however, that changes in equity REIT capitalizations that occurred in 1993 may have been responsible for the differences in predictability of the strategies in the first vs. the second study period and that the break introduced by Glascock et al (2000) was, in fact, important despite the outcomes from the Zivot and Andrews (1992) tests used in this study.

Table 4 Excess Returns over Equity REITS for Differing Strategies

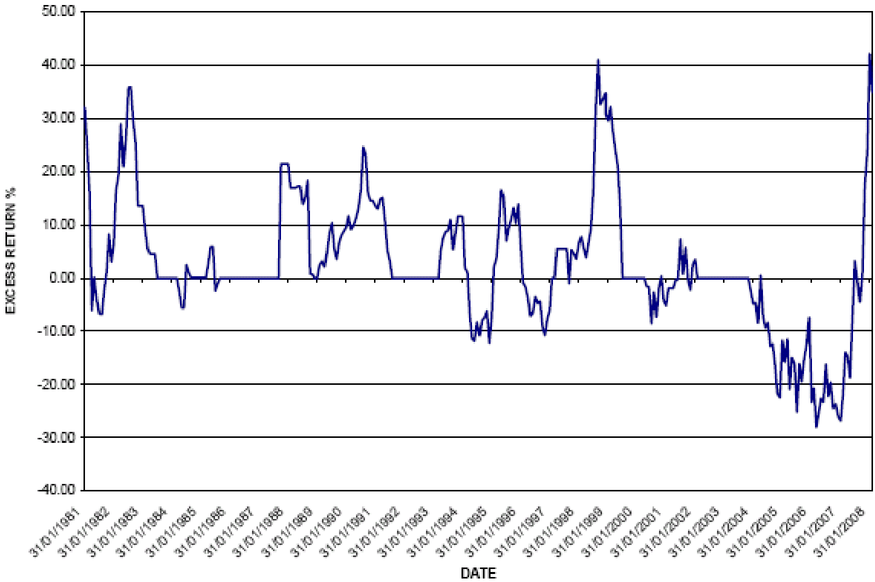
STRATEGY	1/80 – 8/89	9/89 – 12/03	1/80 – 12/03
IMPGRPLB≥0 relative to bonds			
Annual Excess Return	5.8	2.6	3.9
Standard Deviation	10.2	9.1	9.6
t-value	1.8**	1.1	2.0***
IMPGRPTB≥0 relative to Tbills			
Annual Excess Return	5.9	4.2	4.8
Standard Deviation	12.6	8.7	10.4
t-value	1.5*	1.8**	2.3**
CGRPLB≥0 relative to bonds			
Annual Excess Return	4.9	1.9	3.1
Standard Deviation	14.3	8.6	11.2
t-value	1.1	0.8	1.4*
CGRPTB≥0 relative to Tbills			
Annual Excess Return	5.4	2.5	3.6
Standard Deviation	13.8	8.9	11.1
t-value	1.2	1.0	1.6*
FRP≥0 + BONDS			
Annual Excess Return	3.3	1.4	2.0
Standard Deviation	7.5	6.6	6.7
t-value	1.5*	0.8	1.6*

The results to date have been quoted without the inclusion of transaction costs. However, transaction costs do not play a significant role in relation to *ex ante* risk premium strategies. The strategies are generally slow moving since if, for example, one examines Figure 2, it is apparent that in the period 1990-2003, there were only

16 trades – just over one per year (a trade occurs every time the normalized *ex ante* risk premium crosses the time axis).

Figure 3 displays the rolling 12 month excess return of the strategy of the implied growth *ex ante* risk premium relative to s. The average excess return was 4.8% per annum with a standard deviation of 10.4% per annum. It is evident from figure 3 that there may be prolonged periods when the strategy is long in the equity REITS and consequently this produces zero excess returns.

Figure 3 Implied Growth Ex ante Risk Premium Relative to Treasury Bills Rolling 12 Month Excess Returns Average Excess Return = 4.8%, Stdev = 10.4%



The strategies outlined in this paper may not be suitable for an equity REIT fund manager holding only equities (stocks). However, if the portfolio manager holds bonds in the portfolio, this strategy may be appropriate in determining tactical shifts between equity REITs and bonds. Since changes in exposure may be infrequent, as there are periods when positions are not changed for two to three years, the strategy is probably better suited to a large balanced portfolio when it comes to making decisions about asset allocation.

Because the strategy is slow moving, an asset allocator could increase or decrease exposure to equity REITs away from the strategic benchmark allocation to property. For example, when the *ex ante* risk premium ≥0, exposure could be increased to equity REITs by directing incoming funds (or reducing exposure to an unattractive asset class) to equity REITs. Similarly, when the *ex ante* risk premium <0, the exposure to equity REITS could be decreased from the benchmark allocation to property.

4. Conclusion

As pointed out earlier, there has been a great deal of interest in modeling the predictability of asset returns. Historically, two approaches have been used in predicting asset returns, the fundamental approach and modeling investors' perceptions of risk through the use of time-varying risk premiums. The fundamental approach relies on the assumption that asset returns are influenced by some common factors that reflect different stages of the business cycle. Strategies based on forecasts of excess returns from fundamental variables have produced positive excess returns in the 1970's and 1980's. However, the performance of these models in the 1990's has been disappointing. We adopt the alternative approach and model the time variation of the *ex ante* risk premium. Variation of the *ex ante* risk premium appears to capture other factors influencing equity REIT price movements, and we concur with Karolyi and Sanders (1998) that there are important economic risk premiums for equity REITs that are not captured by conventional multiple beta asset pricing models.

Returns based on strategies employing the time variation of the *ex ante* risk premium generate positive excess returns. However, the strategies are probably better suited to tactical shifts of property asset allocation, owing to the slow movement of the indicators of the model. The results for both sample periods suggest that, in the long term, strategies based on modeling the time variation of the *ex ante* risk premium can generate significant positive excess returns.

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