

# **Real Estate Risk Exposure of Equity Real Estate Investment Trusts**

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## **Abstract**

Gloscock, Lu, and So, (2000) show that equity REITs behave more like stocks after 1992. However Clayton and Mackinnon (2003) provide evidence demonstrating that equity REITs become more akin to real estate and less like stocks. Facing the seemingly contradicting evidence produced by the two studies, we extend Hsieh and Peterson (2000) and He (2002) to examine the real estate risk exposure of equity REITs. Contrary to Clayton and Mackinnon's (2003) study, our results do not support that equity REITs are more like real estate after 1992. Our results appear to consistent with Graff and Young (1997) who conclude that the increased institutional interest has caused REIT return behavior to diverge from the returns on underlying REIT property portfolios.

**Keywords:** REIT; Real Estate; Asset Pricing; Real Estate Factor

## **Introduction**

REITs were created by Congress to allow individual real estate investors to pool their investments in order to enjoy the same benefits as direct investors of large-scale real estate properties (Block, 2002). Consistent with the intention, Giliberto's (1990) study on REIT pricing reveals a fundamental link between equity REIT and unsecuritized real estate returns. He shows that quarterly Russell-NCREIF and NAREIT returns are significantly positively correlated over the 1978-89 period after removing stock and bond market influences from the two return series. Nevertheless, Peterson and Hsieh (1997) show that other risk factors influencing traditional common stocks also influence REITs, since REIT shares trade on the NYSE, ASE, and NASDAQ system. In particular, they provide evidence that the three stock market factors are significantly related to equity REIT returns.

The National Association of Real Estate Investment Trusts (NAREIT) reports that the total market capitalization of equity REITs have increased substantially from \$0.33 billion in 1971 to \$5.51 billion in 1990 and to \$151.27 billion in 2002. The REIT market experienced a structure change in early 1990s, as institutional investment increased (Gloscock, Lu, and So, 2000) and mainly on equity REITs (Chan, Leung and Wang, 1998). The structure change might be partly explained by

the depression-like and overbuilt real estate market in the late 1980s and early 1990s as well as the interest rate decline in the early 1990s. The increase in institutional investment in the REIT market was also partly facilitated by the Revenue Reconciliation Act of 1993 that entitles REITs to look through pension funds and qualified trusts and count each of their beneficiaries as an individual REIT shareholder.

Two recent studies examine the link between REITs and unsecuritized real estate returns covering the periods before and after the structure change. Gloscock, Lu, and So (2000) expect that the structure change may allow REITs to behave more like traditional stocks than real estate. Their empirical evidence reveals that equity REITs behave more like stocks after 1992, although equity REITs are conintegrated with the private real estate market during their whole study period. Their results imply that equity REITs do not offer more real estate exposure to investors after 1992. On the contrary, Clayton and Mackinnon (2003) provide evidence demonstrating that equity REITs become more akin to real estate and less like stocks. This result is consistent with Ziering, Winograd and McIntosh's (1997) claim that REIT prices are much more strongly linked with real estate market fundamentals and are more like real estate and less like stocks after 1992. Different from Gloscock, Lu, and So (2000), Clayton and Mackinnon (2003) show that equity REITs become a better proxy for direct real estate

investments.

In addition to producing the above seemingly contradicting suggestion, Clayton and Mackinnon (2003) also have a finding seemingly contrary to Giliberto's (1990) result. According to Clayton and Mackinnon's (2003), equity REIT returns are essentially insensitive to unsecuritized real estate prior to 1992. Nevertheless, in Giliberto study (1990), NAREIT returns are significantly positively correlated with quarterly Russell-NCREIF returns over the 1978-89 period.

Facing the seemingly contradicting evidence produced by the studies, we are motivated to adopt the approach of Hsieh and Peterson (2000) and He (2002) to examine the real estate risk exposure of equity REITs. We ask whether there is a real estate factor in equity REIT pricing after controlling the Fama and French's (1993) stock and bond factors and how the role of real estate factor varies over time.

Contrary to Clayton and Mackinnon (2003), our results show the real estate factor play a significant role in equity REIT pricing before 1992. Consistent with Giliberto (1990), equity REITs provide investors positive exposure to the real estate factor in the 1978-1984 period. On the other hand, the REITs appear to be a hedge for the real estate factor in the 1985-1991 period. This is similar to the negative factor sensitivity of equity REITs on unsecuritized real estate documented in Clayton and

Mackinnon's study (2003). However, in the sub-periods after 1992, equity REITs are not linked to the unsecuritized real estate market. The lack of linkage is consistent with Graff and Young (1997) who conclude that the increased institutional interest has caused REIT return behavior to diverge from the returns on underlying REIT property portfolios.

### **Data and Methodology**

To examine whether there is a real estate risk factor in equity REIT pricing, we collect the following return indices covering the period of 1978 to 2003:

*NAN* = the monthly return on the NYSE/ASE/NASDAQ value-weighted index from *CRSP* stock files.

*SMB* = the monthly returns on mimicking portfolio for the common size factor in stock returns. This is the difference between the simple averages of the percentage returns on the three small-stock and the three big-stock portfolios with similar average book-to-market ratios.

*HML* = the monthly returns on the mimicking portfolio for the common book-to-market equity factor in stock returns. This is the difference between the simple averages of percentage returns on the two high and two low book-to-market equity portfolios with similar average size.

*LONG* = the monthly return on long-term U.S. government bonds.

*CORP* = the monthly returns on long-term corporate bonds.

*SHORT* = the monthly returns on 1-month treasury bills.

*EREIT* = the monthly returns on the NAREIT value-weighted equity REITs.

*RNCR* = the quarterly Russell-NCREIF property return series.

SMB and HML factor returns are provided by Kenneth French. Return series on U.S. government bonds, corporate bonds, and treasury bills are from the SBBI Yearbook published by Ibboston Associate Inc. Equity REIT returns are from the National Association of Real Estate Investment Trusts (NAREIT) and the Russell-NCREIF property return series from the National Council Real Estate Investment Fiduciaries. In order to use *RNCR*, all monthly series are compounded into quarterly series.

Peterson and Hsieh (1997) show that equity REITs are mainly related to the risk factors influencing traditional common stocks. Therefore we first construct the four-factor model similar to Hsieh and Peterson (2000) and estimate the following equation:<sup>1,2</sup>

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<sup>1</sup> Hsieh and Peterson (2000) extend the three-factor (the three stock market factors: an overall market factor, a size factor, and a book-to-market factor) model of Fama and French (1993) to incorporate a real estate factor in their study on common stocks.

<sup>2</sup> Following He (2002) and Tuluca, Myer, and Webb (2000), we do not unsmooth the *RNCR*. Tuluca, Myer, and Webb (2000) give two reasons not to unsmooth the series: [1] Investors have access to returns of commingled real estate funds that comprise NCREIF. [2] The ways to correct the problems inherent in the appraisal-based series are still under refinement.

$$EXREIT = \alpha + \beta_M MKT + \beta_S SMB + \beta_H HML + \beta_N NCR + \varepsilon_p \quad (1)$$

where  $EXREIT = EREIT - SHORT$ ,  $MKT = NAN - SHORT$ ,

$NCR = RNCR - SHORT$ , and  $\varepsilon_p =$  an error term.

Clayton and Mackinnon (2003) show that factors driving bonds drove equity REIT returns over the 1993-1998 period. Hence we also extend the six-factor model of He (2002) from industrial stocks to equity REITs as follows:<sup>3</sup>

$$EXREIT = \alpha + \beta_M MKT + \beta_S SMB + \beta_H HML + \beta_T TERM + \beta_D DEF + \beta_N NCR + \varepsilon_p \quad (2)$$

where  $TERM = LONG - SHORT$ ,  $DEF = LONG - CORP$ , and

$NCR = RNCR - SHORT$ .

To examine whether there is a real estate factor in equity REIT pricing and how the role of real estate factor varies over time, we estimate Equations (1) and (2) over both the full 1978-2003 sample period as well as over three sub-periods. We select the same two cutting points as those in Clayton and Mackinnon's (2003) study. Thus the three subperiods are 1978-1984, 1985-1991, and 1992-2003.

## Empirical Results

The section consists of two parts. Part 1 describes the variables. Part 2 presents the estimation results of Equations (1) and (2).

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<sup>3</sup> He (2002) incorporates a real estate risk factor to the five-factor model (the three stock market factors plus the two bond market factors: the term structure factor and the default risk factor) of Fama and French (1993) in their study on industrial stocks.



## Description of Variables

Table 1 presents the descriptive statistics for the seven variables during 1978-2003. The excess returns for the overall stock market factor (*MKT*) has the highest mean, 2.05%. The mean for the default risk factor (*DEF*) is lowest, -0.05%. The magnitude of the quarterly average excess returns is approximately 0.70% for the real estate factor (*NCR*). The instabilities of the six risk factors are examined with three measures. The standard deviation for the stock market factor is the greatest, 8.61%, while the real estate factor has the smallest standard deviation, 1.48%. The real estate factor, again has the smallest range, 10.24, while the book-to-market factor (*HML*) has the largest, 50.29. The coefficient of variation also indicates that the real estate factor is the most stable risk factor. However this measure shows that the default risk is the most unstable.

Excess return on equity REITs (*EXREIT*) overall has highest correlations with the stock market factors, medium correlations with the bond market factors, and lowest correlation with the real estate factor. *EXREIT* has the highest correlation with *KMT* (0.59) and a slightly lower correlation with *SMB* (0.51). The correlations between *EXREIT* and other factors are much lower. In fact *EXREIT* has the lowest correlation with *NCR* (0.00). The results indicate that the stock market factors may be most relevant in explaining variation in excess returns for equity REITs.

The correlations among the six variables representing stock, bond, and real estate factors are low. The highest correlation in absolute value is between *TERM* and *DEF* (-0.53) and the second highest is between *KMT* and *SMB* (0.46). The correlation between *KMT* and *HML* is slightly lower (-0.43). All other correlations are much lower. These results do not suggest significant multicollinearity difficulties in the six factors.

### **Estimation Results**

Box-Pierce Q-statistics do not indicate the presence of first-order autocorrelation problems. In addition, results of the Koenker-Bassett test do not suggest heteroscedasticity problems. Therefore we estimate Equations (1) and (2) with OLS regression. Their estimation results are in Tables 2.

Panel A presents the estimation results of the four-factor model of Equation (1) and Panel B shows the results of the six-factor model of Equation (2). Results are presented first for the full sample period and then for the four sub-periods to determine if there have been changes in the sensitivities of REIT returns to the factors over time.

Over the full 1978-2003 period, the  $R^2$  is 0.53 for the four-factor model and is 0.58 for the six-factor model. Consistent with Peterson and Hsieh (1997), the coefficients on *MKT*, *SMB*, and *HML* are significant at 1% level over the full

sample period in both panels. In addition, the coefficient estimate for *TERM* in Panel B is significant at 5% level. The coefficient on *DEF* is not significant. The sensitivities to bond market factors are different from those of Peterson and Hsieh (1997). However the results are consistent with those of Clayton and Mackinnon's (2003) who also show that equity REITs are sensitive to bond-related factors. The coefficients of the three stock market risk factors are larger in magnitude than the bond market factor. The results indicate that the three stock market risk factors were primary drivers of equity REIT returns over the full sample period and are consistent with those of Clayton and Mackinnon's (2003). Nevertheless the real estate factor does not have a significant coefficient estimate in either panel. Thus real estate fundamentals did not appear to play a role in pricing equity REIT returns over this period. This result regarding real estate factor over the full sample period is consistent with Clayton and Mackinnon's (2003) result over their full sample period.

In agreement with Clayton and Mackinnon's (2003) results, our sub-period results reveal that the roles of the risk factors vary over time. The portion of REIT return fluctuation explained by either the four-factor model or the six-factor model declines from around 80 percent before 1992 to about 40% after 1992. That is, there are a substantial increased proportion of REIT return movements not accounted by stock, bond, or real estate factors after 1992. These declines in the overall model fits

are consistent with Clayton and Mackinnon's (2003) study. In addition, consistent with Chiang, Kozhevnikov, Lee, and Wisen (2005), the declines appear to be driven by the declining explaining power of Fama and French's (1993) three-factor model on equity REIT returns past 1992.

Sub-period results in Panels A and B expose the similar patterns with regard to the sensitivities of the three stock market factors. Specifically equity REITs had greatest sensitivity to *MKT*, but this sensitivity has declined over time. The sensitivity to *SMB* are not stable in terms of relative changes in magnitude and significance of its coefficients. The coefficients on *SMB* are not significant in the 1978-1984 period, and have the greatest magnitudes during the latter half of 1980s. The magnitude declines one-half after 1992. The sensitivity of equity REIT returns to *HML* is relatively stable over sub-periods. The sensitivities to the bond market factors are in Panel B. The sub-period results show that equity REITs are sensitive to *TERM* significantly only during the 1985-1991 period. This indicates that, same to their exposure to stock market factors, the exposure of equity REITs to bond market factors are time-varying.

More interestingly and importantly, the sub-period results in both Panel A and B present a pattern of the sensitivity of equity REITs to the unsecuritized real estate market different from that of Clayton and Mackinnon (2003). Contrary to their study

and consistent with Giliberto's study (1990), our results show that equity REITs are significantly sensitive to the real estate factor during the 1978-1984 period. Similar to Clayton and Mackinnon's (2003) results, the coefficients on *NCR* are negative during the 1985-1991 period in both panels. One possible reason for the negative coefficients is the combination of the real estate recession in the early 1990s (NAREIT, 2004) and the bull REIT market starting from 1991 (Block, 2002).

Interestingly, contrary to Clayton and Mackinnon's (2003) study, equity REIT returns are insensitive to unsecuritized real estate after 1992 in both Panel A and B. Chan, Leung, and Wang (1998) document that institutional investors participate in the REIT market actively starting 1990 and in particularly after 1994. Given this documentation, our results appear to be consistent with Graff and Young (1997) who conclude that the increased institutional interest has caused REIT return behavior to diverge from the returns on underlying REIT property portfolios. Therefore, contrary to Clayton and Mackinnon's (2003) study, our results do not support Ziering, Winograd, and McIntosh's (1997) claim that REITs are more like real estate after 1992.

## **Conclusions**

The results of Gloscock, Lu, and So (2000) imply that equity REITs do not offer more real estate exposure to investors after 1992. In contrast, Clayton and Mackinnon (2003) demonstrate that equity REITs become a better proxy for direct real estate

investments. Facing the seemingly contradicting evidence produced by the studies, we extend Hsieh and Peterson (2000) and He (2002) to examine the real estate risk exposure of equity REITs.

Over the entire sample period, equity REITs are significantly sensitive to the overall stock market factor, the size factor, and the book-to-market factor, and the term-structure factor. However equity REITs are not sensitive to the real estate factor proxied by Russell-NCREFF property return index. Consistent with Giliberto (1990), our sub-period results demonstrate that equity REITs provide investors positive exposure to the real estate factor in the 1978-1984 period. However, contrary to Clayton and Mackinnon (2003), our sub-period analysis does not show that the real estate factor does not emerge as an important factor in equity REIT pricing after 1992.

Overall our results does not support Ziering, Winograd and McIntosh's (1997) claim that REIT prices are much more strongly linked with real estate market fundamentals and are more like real estate and less like stocks after 1992. Our results appear to consistent with Graff and Young (1997) who conclude that the increased institutional interest has caused REIT return behavior to diverge from the returns on underlying REIT property portfolios.

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Table 1. Summary statistics for the quarterly returns for the 1978-2003 period.

Variable	Mean	Std. Dev	Range	C.V.	Correlations								
					REIT	MKT	SMB	HML	TERM	DEF	NCR	DNCR	
REIT	2.02	6.89	37.79	3.41	1.00								
MKT	2.05	8.61	44.96	4.19	0.59	1.00							
SMB	0.74	5.35	28.55	7.19	0.51	0.46	1.00						
HML	0.79	6.79	50.29	8.56	0.07	-0.43	-0.12	1.00					
TERM	0.96	6.26	39.11	6.53	0.28	0.18	-0.11	-0.01	1.00				
DEF	-0.05	1.83	12.56	-36.68	0.02	0.08	0.29	0.16	-0.53	1.00			
NCR	0.70	1.48	10.24	2.13	0.00	-0.04	-0.02	-0.03	-0.16	-0.01	1.00		

**Table 2.** Regression of excess returns of EREIT on risk factors

	1978 -2003	1978 -1984	1985 -1991	1992-2003
<b>Panel A: The Four-Factor Model</b>				
Constant	0.32 (0.58)	-1.78 (-1.46)	0.10 (0.15)	0.78 (0.75)
MKT	0.50 (7.29)***	0.95 (7.05)***	0.54 (6.17)***	0.31 (2.89)***
SMB	0.35 (3.46)***	0.13 (0.71)	0.66 (4.14)***	0.29 (1.92)
HML	0.37 (4.76)***	0.53 (3.31)***	0.47 (2.60)**	0.39 (3.76)***
NCR	0.18 (0.56)	1.71 (2.72)***	-0.66 (-1.74)	0.20 (0.31)
$R^2$	0.53	0.79	0.85	0.38
<b>Panel B: The Six-Factor Model</b>				
Constant	0.04 (0.08)	-1.86 (-1.58)	-0.25 (-0.39)	0.27 (0.25)
MKT	0.45 (6.47)***	0.73 (3.67)***	0.49 (5.61)***	0.39 (3.50)***
SMB	0.44 (4.39)***	0.21 (1.09)	0.71 (4.65)***	0.41 (2.66)***
HML	0.37 (4.72)***	0.39 (2.19)**	0.46 (2.82)***	0.47 (4.22)***
TERM	0.21 (2.25)**	0.15 (1.21)	0.29 (2.08)**	-0.01 (-0.03)
DEF	-0.28 (-0.87)	1.16 (2.00)	0.15 (0.37)	-1.11 (-1.48)
NCR	0.32 (1.02)	2.01 (3.23)***	-0.65 (-1.90)	0.23 (0.38)
$R^2$	0.58	0.83	0.89	0.45