An Analysis of Relative Return Behavior: REITs vs. Stocks

Jorg Bley

American University of Sharjah

and

Dennis Olson

American University of Sharjah

Abstract

We have analyzed the return behavior of the equity REIT, mortgage REIT, and SP500 indices using monthly data for the period of 1972-2001. Following a large monthly gain, investors can benefit by adopting a momentum buying strategy for stocks or mortgage for REITs, but not for equity REITs. Investors can also profitably employ a mean reversion strategy for any of the three indices. They would wait for a large decline and then buy the index and hold it for six months. Significant calendar effects were found for both REIT and stock indices involving positive January, and negative August and October effects, although there are some differences in seasonal effects between REITs and stocks. The correlation coefficients between all three asset classes are similar, but the relationship between stocks and equity REITs has lessened over time. We also show that equity REITs dominate mortgage REITs on a risk-return basis and that REITs compare favorably with stocks. Our findings suggest that equity REITs can enhance the risk-return relationship of an investment portfolio and should be considered as a major asset class just like stocks or bonds.

1. Introduction

A sizeable body of literature has developed that examines the behavior of real estate investment trust (REIT) returns relative to those of common stocks. An important theme in many studies has been whether REITs are sufficiently different from stocks to provide diversification benefits or enhance portfolio returns. Hudson-Wilson (2001) shows that REITs under perform both bonds and stocks on a risk-return basis over the 1987-2000 period; while Ibbotson Associates (2002) indicate that inclusion of REITs into a well-diversified stock and bond portfolio could have enhanced returns by up to .8% annually over the period 1972-2001 and by 1.3% annually for the years 1992-2001. The methodology varies between these two studies, but the apparently conflicting results arise primarily from differences in time periods considered. In particular, pension funds have been allowed to invest in REITs since January 1, 1993, so that REITs have become a different type of investment than they were in earlier years. Clayton and MacKinnon (2001) discuss the time-varying nature of the link between REIT, stock, and bond returns and point out that return relationships underwent a structural change during the REIT boom of 1993-1997. Given the recent changes in the REIT industry, it may be useful to revisit the risk-return characteristics of REITs to see if previously identified return patterns still hold for REITs relative to stocks.

In this paper, we analyze the return behavior of REITs and stocks using monthly data for the period of 1972-2001 to determine whether investors should consider adding REITs to traditional stock and bond portfolios. We examine returns for equity and mortgage REIT indices and for the Standard and Poor's 500 stock index (SP500) to address three issues.

First, there has been some debate over whether stocks and REITs exhibit momentum, mean reversion, or both types of behavior. For example, using monthly return data for the SP500 index, Seligman (2000) found that only a few extraordinarily good months account for a large portion of the entire holding period's return. The biggest gains were concentrated in months following large declines, directly supporting the mean reversion argument. Jegadeesh and Titman (1993, 2001) have documented the success of momentum strategies in the stock market for time horizons of generally three to six months. Similarly, Chui, Titman, and Wei (2001) find momentum effects in REIT portfolios over six-month holding periods that are even stronger than the momentum effects for stocks. To address this issue, we

identify the twenty-four largest monthly increases and decreases for the equity REIT, mortgage REIT, and SP500 indices--similar to the selection procedure employed by Seligman (2001). Then, we apply the event study methodology to measure the subsequent response to these events to determine whether momentum or mean reversion is prevalent for each index and whether REITs behave differently than stocks during these periods.

A second area of focus is to investigate monthly seasonal effects across our three asset classes. As in tests conducted by Chui, Titman, and Wei (2001), this framework can indicate whether monthly effects contribute to either momentum profits or mean reversion. Evidence of a January effect in equity securities is abundant and not limited to the US [see e.g., Rozeff and Kinney (1976), Reinganum (1983), and Keim (1983)]. Also, Ma and Goebel (1991) observe the January effect in securitized mortgage markets, while Colwell and Park (1990) and McIntosh, Liang, and Tompkins (1991) document calendar effects in REIT returns. As seasonalities for each asset class are documented and become widely known, they are subject to short-term trading activities designed to exploit inefficiencies. Thus, testing for the persistence of monthly calendar effects is also a test of market efficiency for each type of financial asset.

The third objective of this paper is to identify the degree of correlation between equity REITs, mortgage REITs and stock returns. If REITs are not highly correlated with stocks, or if this correlation has been declining over time, REITs can enhance the risk/return relationship of a general stock portfolio, as suggested by Hudson-Wilson (2001). With the elimination of pension fund investment barriers in January 1993, more institutional investors entered and more analysts covered the REITs market (Chan, Leung, and Wang 1998). With the recent attention placed on REITs, they could become more like stocks. However, recent work by Clayton and MacKinnon (2001) and Chui, Titman, and Wei (2001) suggests that the opposite may have happened in recent years. To further investigate this issue, we examine correlations between the three asset classes for the pre-1993 period, the years 1993-1999, and for 2000-2001, which represents the recent bear market for stocks.

2. Data and Methodology

The data set of monthly REIT returns for January 1972 to December 2001 is calculated from monthly index prices of equity REITs (ERI) and mortgage REITs (MRI) available on the National Association of Real Estate Investment Trusts

website. Monthly returns for the SP500 index and returns on Treasury bills are obtained from Pinnacle Data Corporation. These data are used to analyze the return behavior of REITs relative to stocks (SP500), and as discussed earlier, the empirical analysis focuses on three major issues.

2.1. Mean Reversion or Momentum?

Monthly returns on the ERI, MRI, and SP500 index are ranked in order of decreasing (increasing) abnormal returns. This formulation modifies and extends ideas presented in Seligman (2001), who looks at the 41 largest return months for the SP500 and discovers that they occur primarily after the months of largest declines for the SP500. Two samples are formed for each index, consisting of the 24 best and 24 worst months. These 48 top or bottom performing months are labeled "event month". Event study methodology was used to determine abnormal returns subsequent to a significant up or down moves. Abnormal index returns are measured over a ten month event window that includes the three months prior to the event, *t-3* to *t-1*, the event day *t=0*, and the subsequent six months of returns *t+1* to *t+6*. Abnormal returns are calculated as the difference between actual return and expected return based upon the monthly return over the previous 12 months:

$$(1) \qquad AR_{it} = R_{it} - E(R_{it}),$$

where R_{it} is the actual rate of return on index *i* for the event month *t*, and $E(R_{it})$ is the expected rate of return on event month *t*. For a sample of *N* events (24 in our analysis), an average abnormal return (AAR_t) for each event month is computed as:

$$(2) \qquad AAR_t = \left(\frac{1}{N}\right)\sum_{i=1}^{N} AR_{it}$$

The cumulative average abnormal return ($CAAR_t$) for any event month *j* within the 10-month window from *t-3* to *t+6* is computed as:

$$(3) \qquad CAAR_t = \sum_{t=0}^{j} AAR_t$$

2.2. Seasonality

To assess possible calendar effects, each of the three market indices (ERI,

MRI, and SP500) is regressed on a set of 12 monthly dummy variables:

$$R_i = \alpha_i + \sum_{m=1}^{12} \beta_{im} TD_m \tag{4}$$

where:

R_i = the monthly return on the market index *i*

α_i = the intercept term

β_{im} = the slope coefficient associated with the time dummy variables

TD_m = the time dummy variable, equal to one if the index return was generated in month m; zero otherwise

Instead of regressing the index return on a set of eleven time dummy variables, leaving an arbitrarily chosen month, e.g., January, to become the intercept term, with the β_{im} coefficients measuring the pairwise difference between the average return in January and each of the other months (see for example Friday and Peterson (1997) or Redman, Manakyan, and Liano (1997)), the β_{im} coefficients in equation (4) represent the pair-wise difference between the average monthly across all 12 months and the average return in each of the months--January through December.

Setting up a regression model that incorporates a dummy for each class of independent variables creates computational difficulties due to perfect colinearity between the dummy variables.[1] As no unique set of coefficients minimizes the sum of the squared disturbances ε^2, any constant *K* can be subtracted from the value of each of the coefficients and added to the intercept without altering any statistical properties of the model. As equation (4) incorporates a complete set of time dummy variables (representing all twelve months), the constant *K* can be defined as the average monthly return, subtracted from each of the coefficients of the set of time dummies, and added to the equation's intercept, that is $\alpha_i = K$ for each index. Equation (4) can be estimated by ordinary least squares regression using the E-Views 4.1 statistical package if the additional constraint

$$\sum_{m=1}^{12} \beta_{jm} = 0 \tag{5}$$

[1] As each class of qualitative predictor variable is represented by an indicator variable, the columns of the X'X matrix become linearly dependent. Thus, the X'X matrix has no inverse and no unique estimators of the regression coefficients can be found.

is imposed so that the average month's effect is zero and a set of unique values of the coefficients can be obtained.[2]

The least squares estimate of the intercept term, α_i, is equal to the average monthly return on the market index *i*, since the average residual is zero in every month.[3] Thus, the calendar effects are estimated net of the average monthly index returns for any given period.

2.3. Market Correlations

The correlation coefficients are computed pairwise for the ERI, MRI, and the SP500 index on a 24-month rolling basis. The resulting correlation coefficients are regressed on constant, a trend variable that increases by one with each monthly observation, and two dummy variables that indicate how the trend changes between time periods. The intercept shows the estimated general correlation coefficient at the beginning of 1972 and the β_1 coefficient shows the monthly trend over the 1972-1992 period (the trend dummy is one for all years, but when additional trend subperiod dummies are added, it then captures the trend in the first subperiod). The dummy variables TD_2 and TD_3 for the years 1993-2001 and 2000-2001 reflect the period after the elimination of the pension fund barrier for investing in REITs, and the recent bear market in stock returns. The β_2 coefficient actually measure trend changes for 1993-1999 relative to 1972-1992, while the β_3 coefficient to capture any additional trend changes for 2000-2001 relative to the second subperiod. The regression equation is:

$$(6) \qquad \rho_{ij,t} = \alpha_t + \beta_{1t}\, Trend_{ij} + \beta_{2t}\, Trend_{ij} * TD_1 + \beta_{3t}\, Trend_{ij} * TD_2 + \varepsilon_{ij},$$

where:

$\rho_{ij,t}$ = the correlation coefficient between market index *i* and *j* at time *t*

α_t = the intercept term

β_{1-3t} = the slope coefficient associated with each independent variable

$Trend_{ij}$ = trend variable, indicating the change in the correlation coefficient over the entire 1972-2001 period.

[2] See also Suits (1984) and Kennedy (1986) for a detailed discussion.

[3] By construction, in OLS estimation of a regression the estimated disturbances are orthogonal to all months.

TD_1 = the time dummy variables equal to one starting January 1993; zero otherwise.

TD_2 = the time dummy variables equal to one starting January 2000; zero otherwise.

ε_{ij} = the random error term

3. Empirical Results

3.1. Mean Reversion or Momentum?

As shown in Exhibit 1, the SP500's best 24 months are preceded by two months of negative returns with a CAAR of -3.53%. The average abnormal return of the event month t_0 is 8.85%. With AARs for the following six months t_{+1} to t_{+6} all being positive (ranging from 0.32 to 1.23%), the SP500 index clearly displays momentum behavior following large gains. An investor, who benefited from the high returns of an event month, would not have to suffer from the negative consequences of a severe market reaction, due to the lack of a mean reverting tendency. Even more interesting is the finding that an investor could have earned a modest abnormal return simply by investing in the SP500 immediately after a significant upturn. The result would have been a positive CAAR of 3.91% for the period of t_{+1} to t_{+6}.

The SP500's worst 24 months generated an AAR of - 9.72%. As shown in Exhibit 1, monthly AARs range from 0.15 to 0.99% for the subsequent 6-months period and CAAR = 3.96%, indicating that it is beneficial to invest in the SP500 index right after a huge downturn to capture the subsequent impact of mean reversion.

The return analysis of the ERI reveals a picture somewhat different from that of the SP500 index (Exhibit 2). Both the upswings and especially the downswings of the ERI are less pronounced. The 24 best (worst) months produce average abnormal returns of 8.03% (-8.15%). Following the best months, the AARs for *t+1* to *t+4* are negative, indicating some profit taking and minor evidence of mean reversion. Consequently, following a major up move, investors should retire from the equity REITs markets for a period of four to six months to avoid the negative impact of what technical analysts would describe as a market reaction. Following months with unusually high negative returns, the ERI recovers less quickly than the SP500 index. While the latter generates positive AAR in the month immediately following a large downturn, AARs for *t+1* are still negative (-1.69%) for the ERI and become positive only in the months *t+2* to *t+5*, with averages ranging from 1.10% to 1.86% for the

former. The ERI displays continued negative momentum in the month following a large decline and then finally mean reversion sets in and CAAR increase by 5.38% from periods *t+1* to *t+6*.

As shown in Table 1, the MRI is more volatile than both the ERI and the SP500 index. Its standard deviation is 5.77% per month over the period 1972-2001, versus 3.92% and 4.50% for ERI and SP500, respectively. In addition, the mean monthly return of .44% per month is noticeably smaller than the .98% and .95% monthly returns for ERI and the SP500. On a pure risk-return basis, mortgage REITs may not make sense for inclusion in investment portfolios. The best (worst) 24 months AAR for the MRI on event days is 12.57% (-11.69%). This compares with 8.03% (-8.10%) and 8.85% (-9.72%) for the ERI and the SP500 index (Exhibit 3). Surprisingly, the MRI behaves more like the SP500 index than like the ERI. CAARs for the three months preceding the event month, average -4.13% (compared to -3.53% for the SP500 index). Beginning with the event month rather than month *t-3*, CAAR cumulate to 19.72% by month *t+6* and CAAR for months *t+1* to *t+6* are 7.15%. Both the SP500 and mortgage REITs display continuation of momentum in the months following a large gain, but the momentum effect is considerably more pronounced for mortgage REITs.

The mean reverting tendency of the MRI following the 24 worst months is also more pronounced than that of the ERI and the SP500 index. The ERI displayed positive AARs prior to the event month, AAR = -11.69% for *t=0*, and CAAR of 9.80% over months *t+1* to *t+6*. This compares to values of 5.38% and 3.91% for mean reversion on the ERI and SP500 indices over the same period.

3.2. Seasonality

As shown in table 2, each of the three indices displays significant calendar effects that appear to be non-stationary and somewhat from those of the other indices. The ERI experienced a significant positive January effect during 1972-1976 and 1987-1991 (at the 1% and 5%-level, respectively). The first 5-year subperiod also experienced a negative May and November effect (at the 5% and the 10%-level) and a positive June effect (at the 5%-level). During the subsequent 5-year period 1976-1981, a negative September was the only significant calendar effect (at the 10%-level). Calendar effects were also found during 1981-1986, with July being negative and October being positive (both significant at the 10%-level). For the period 1987-1991, the positive January effect resurfaced (significant at the 5%-level). Starting with

the financial market crash of 1987, an October effect was created that remained significant throughout three 5-year subperiods until 2001. While the calendar effect during 1991-1996 was positive and significant at the 5%-level for the month of December, it was the month of August during 1997-2001 that was negative and significant at the 10%-level.

Some of the calendar effects for MRI returns are similar to those for the ERI: positive January returns during 1972-1976, 1987-1991, and (contrary to ERI) also present during 1992-1996 (significant at the 1%, 10%, and 1% levels, respectively), positive October (5% significance level) during 1982-1986, negative October (5% significance level) during 1987-1991 (not significant in any subsequent period), and negative in August (1% significance level) during 1997-2001. In addition, calendar effects were found for the MRI during 1972-1976 (negative in August, at the 10% level), 1977-1981 (positive in April at the10% level) and negative in October (10% significance level).

Some of the calendar effects displayed by the ERI and MRI can also be found in the returns of the SP500 index: the positive January effect during 1972-1976 and the negative effects in October and August during 1987-1991 and 1996-2001, respectively (significant at the 10%, 5%, and 10%-level). Similar to the MRI, a negative effect was found during 1977-1981 for the month of October (10%), and similar to the ERI, a negative effect was found during 1982-1986 for the month of July (5%). In addition, significant calendar effects were found only in the returns of the SP500 index for October (positive during 1972-1976), November (positive during 1977-1981), August (positive during 1982-1986) and September (negative during 1982-1986). Contrary to the ERI and MRI, no significant calendar effects were found for stocks for the subperiod of 1992-1996.

Our results provide evidence for the existence of significant calendar effects across all three asset classes. These effects may play some role in momentum (positive Decembers and Januaries), but seasonality does not seem to explain the differential behavior of equity REITs relative to mortgage REITs and stocks after a large up move in the index. Also, given the non-stationary nature of the monthly effects, seasonality does not seem to explain either momentum or mean reversion in index returns. Nevertheless, the non-stationary of monthly effects doe support the Efficient Market Hypothesis. As investors incorporate the anticipation of these calendar effects into their trading strategies, they cause them to disappear.

The fact that calendar effects differ across the three market indices indicates differences in market return behavior and potential benefits from diversifying across asset classes. Several authors have focused on these return differences. Hudson-Wilson (2001) points out that a partial investment in REITs can enhance the risk/return relationship of the portfolio. Booth, Cashdan and Graff (1989) conclude that investors should differentiate between equity REITs and mortgage REITs, as the former behave more similar to equity while the latter is closer related to fixed-income debt securities. However, the poor risk-return results for mortgage REITs may not make them suitable replacements for bonds, or as desirable as equity REITs. Subsequently, we will analyze the return correlation between the three market indices in search for possible changes in the relationship that occurred over time.

3.3. Market Correlations

The time trend analysis of the market index correlation coefficients reveals that ERI and MRI behave quite similarly (table 3 shows $\alpha = .75$, or a high initial degree of correlation starting in 1972). The negative coefficients β_1 and β_2 associated with the variables Trend and TD_2 respectively, indicate a slight reduction of ρ over time in general and after January 1993 in particular (both significant at the 1%-level). This finding is surprising in light of the notion that equity REITs behave more like stocks and mortgage REITs behave more like bonds, e.g., see Hudson-Wilson (2001). Only the last two years of the observation period have seen an upward change of this trend, as indicated by the positive β_3 coefficient (significant at the 5%-level).

The base correlation coefficient (the α portion of ρ) is .66 between the ERI and the SP500 and .68 between the MRI and the SP500. Surprisingly, mortgage REITs and stock returns are more closely related than are equity REITs and stock returns. In fact, negative β_2 and β_3 coefficients indicate an increasing level of "disconnect" between ERI and the SP500 index (both significant at the 1%-level). A similar trend can be found in the relationship between the MRI and the SP500 index. Since mortgage REITs are actually more correlated with the SP500 than are equity REITs and provide lower returns at higher risk, there is little reason to include mortgage REITs in an investment portfolio. However, our findings suggest that (1) equity investors can reduce portfolio risk by including both equity REITs in a stock and bond portfolio, and (2) the diversification effect of including REITs in the portfolio has increased over time. Equity REITs can enhance the risk/return relationship of a general stock portfolio and long-term investors aiming for a well balanced portfolio

should monitor any changes in the relative return behavior of asset classes and, from time to time, adjust the portfolio weights if necessary.

4. Conclusions

We have analyzed the return behavior of the equity REIT, mortgage REIT, and SP500 indices using monthly data for the period 1972-2001. A major goal was to identify recurring return patterns in each index that could be exploited by either momentum or mean reversion trading strategies. Our results differ across markets. Investors can obtain positive abnormal returns from a momentum strategy that buys either the mortgage REIT or the SP500 index immediately after the index has experienced a significant up move. The equity REITs market should be avoided for about four months after a large monthly gain due to its mean reversion tendencies. For all three assets classes, investors can earn above average returns from buying and holding the index for the six month period immediately following a large monthly decline. Both stocks and REITs display mean reversion after large declines, confirming the often repeated investment advice to avoid selling immediately after a large decline in asset value.

Significant calendar effects were found for both REIT and stock indices, although the general pattern for monthly effects differs across asset classes. However, positive January, and negative August and October effects were found in all index return series for several subperiods. The non-stationary of these effects suggests that investors may have already incorporated this knowledge into their trading strategies as would be consistent with the Efficient Market Hypothesis. We also examined correlation and changes in correlation between asset classes over the period 1972-2001. Both mortgage and equity REITs have become less correlated with S&P 500 from 1972 to 2001, but the difference has become greater for equity REITs than for mortgage REITs. Equity REITs also provide a more favorable risk-return ratio than mortgage REITs. Our findings suggest that equity REITs can enhance the risk-return relationship of a general stock portfolio and probably should be added to many investors' stock and bond portfolios. Mortgage REITs may be useful for diversification, but greater benefits are obtained by adding equity REITs to a portfolio.

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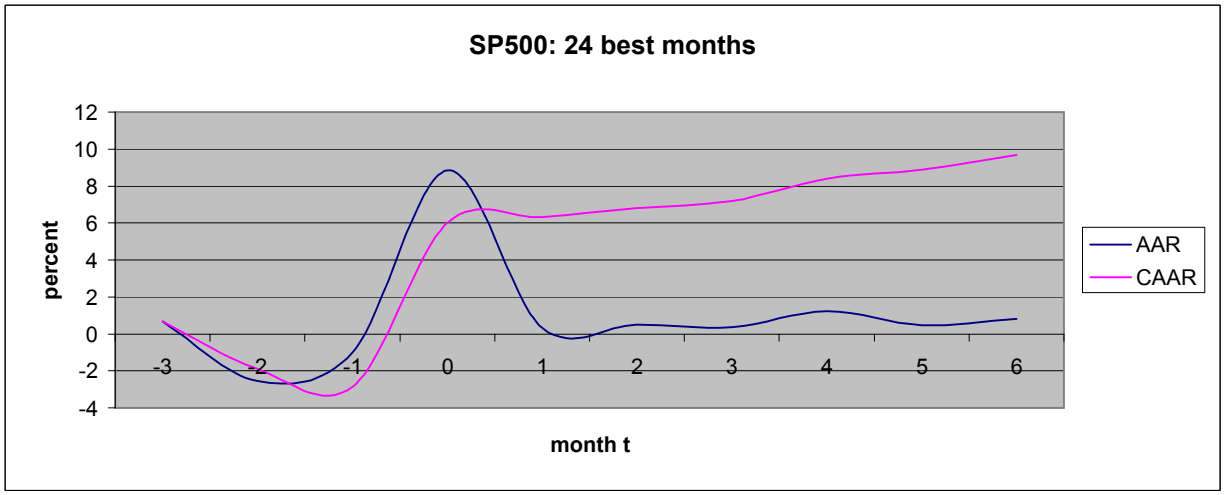
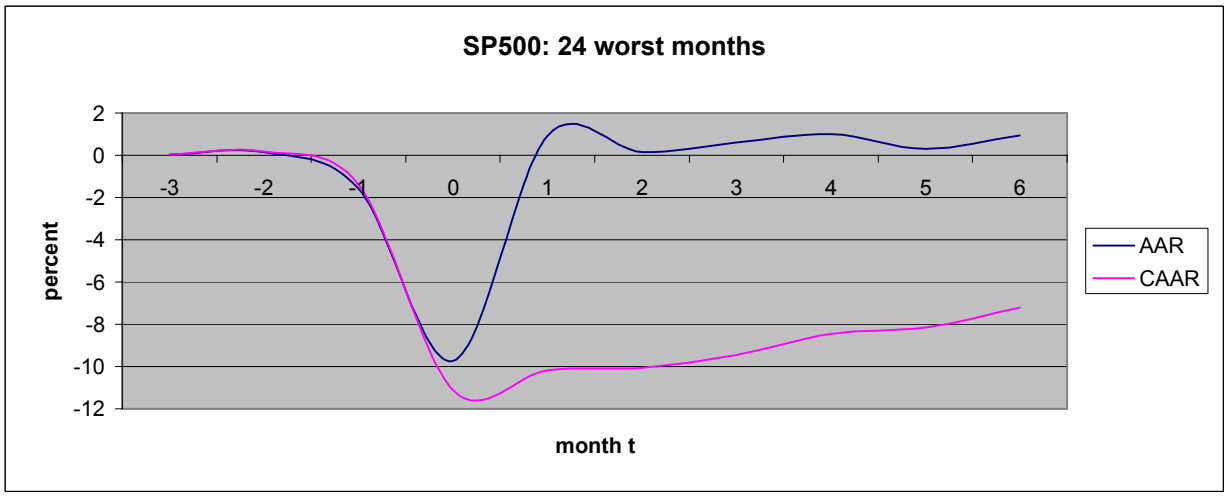
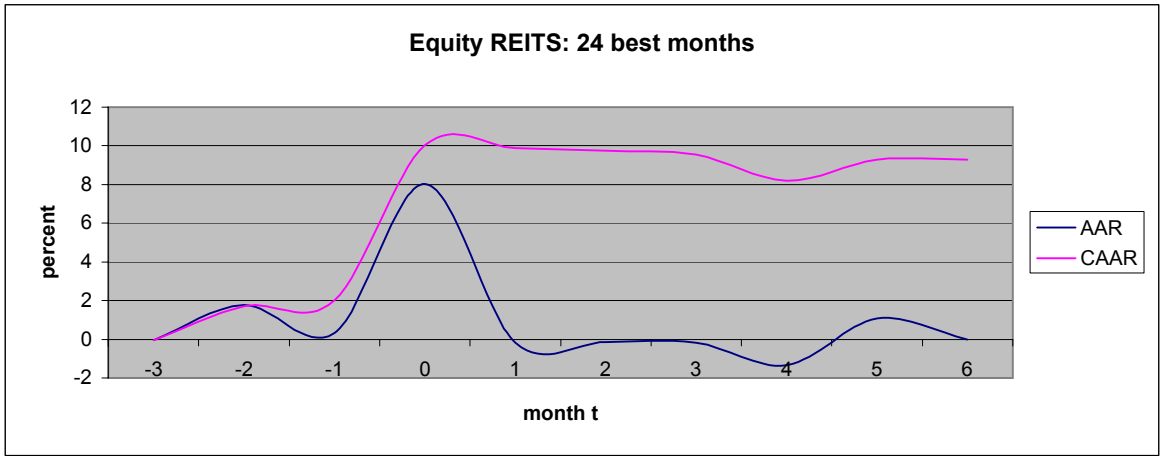


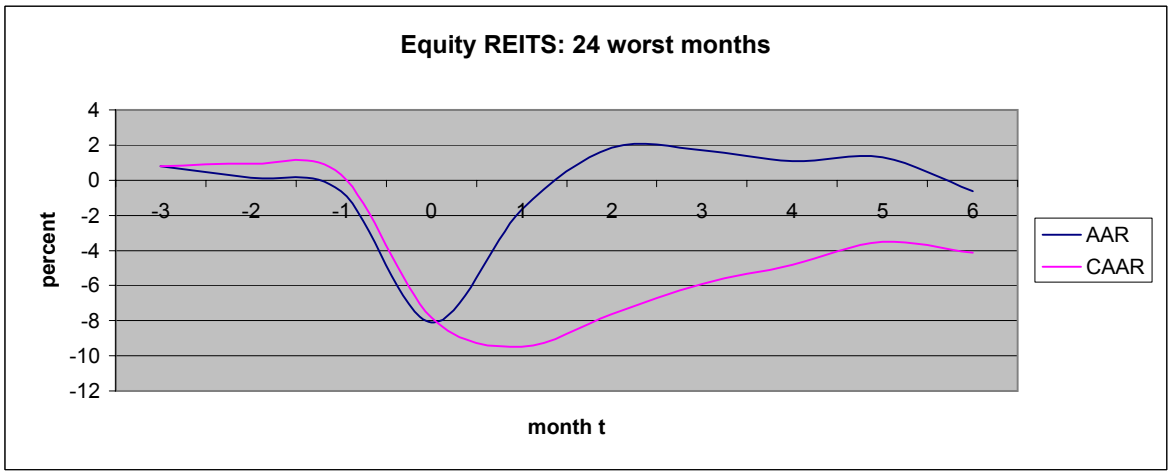
Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	0.6906	-2.5609	-0.9727	8.85	0.3155	0.4875	0.3676	1.2342	0.4697	0.8081
CAAR	0.6906	-1.8703	-2.843	6.007	6.3225	6.81	7.1776	8.4118	8.8815	9.6896
F-stat	0.52	5.86**	0.88	82.97***	0.13	0.29	0.17	1.67	0.27	0.72



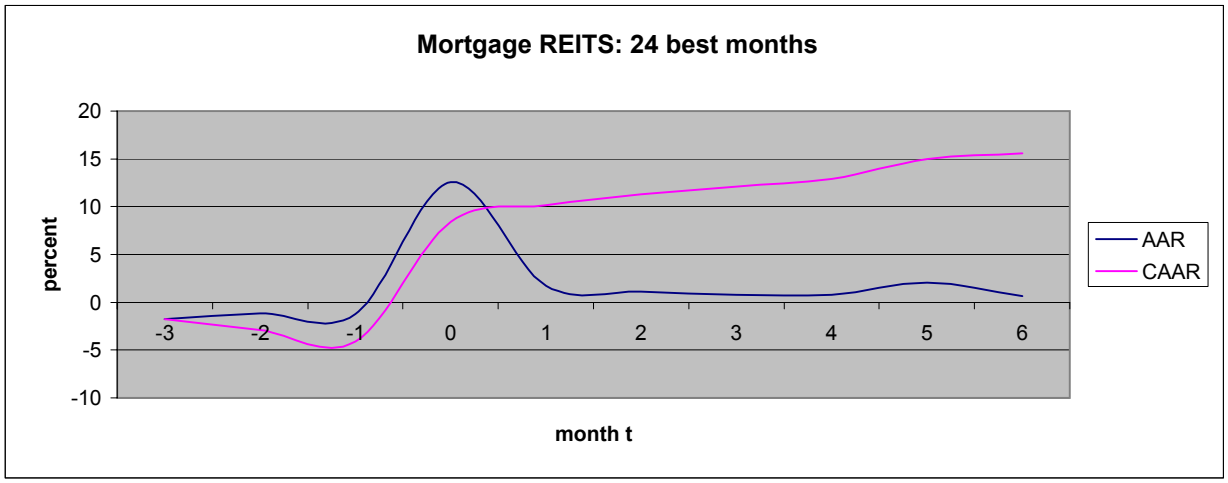
Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	0.03695	0.1477	-1.5822	-9.7179	0.9186	0.1499	0.6054	0.9922	0.2951	0.9497
CAAR	0.03695	0.18465	-1.39755	-11.1155	-10.1969	-10.047	-9.44155	-8.44935	-8.15425	-7.20455
F-stat	0.01	0.04	2.28	95.48***	0.89	2.27	0.43	1.08	0.11	0.99



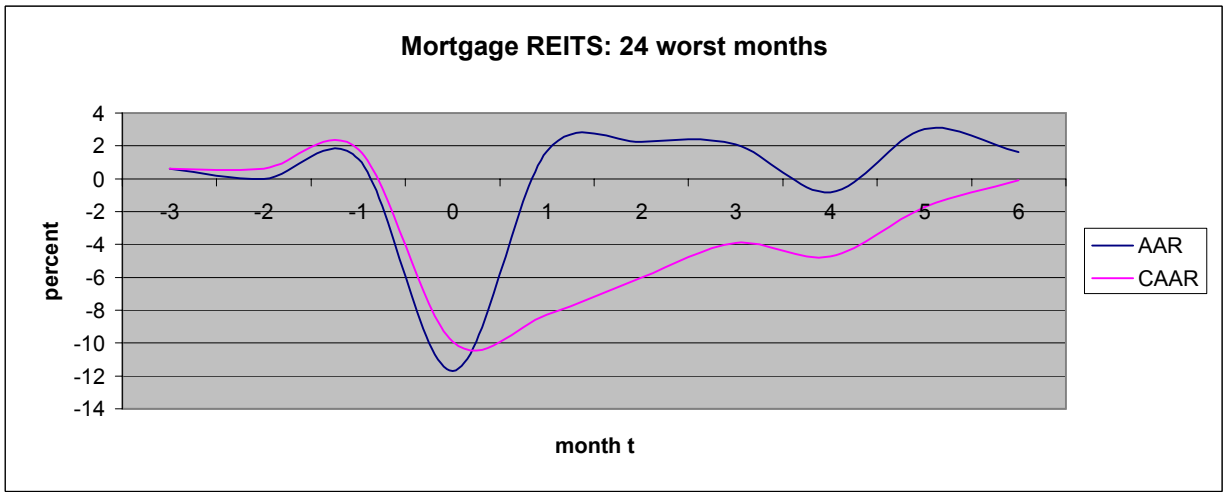
Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	-0.054	1.7717	0.3021	8.0324	-0.1749	-0.1414	-0.1896	-1.3545	1.0879	-0.0077
CAAR	-0.054	1.7177	2.0198	10.0522	9.8773	9.7359	9.5463	8.1918	9.2797	9.272
F-stat	0.01	4.31**	0.12	95.37***	0.52	0.03	0.06	2.63	1.66	0.01



Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	0.7994	0.1422	-0.6338	-8.1054	-1.6885	1.8618	1.7097	1.0973	1.3203	-0.613
CAAR	0.7994	0.9416	0.3078	-7.7976	-9.4861	-7.6243	-5.9146	-4.8173	-3.497	-4.11
F-stat	0.88	0.02	0.59	94.68***	4.01**	4.85**	4.14**	1.64	2.27	0.53



Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	-1.7334	-1.1758	-1.2185	12.5737	1.7067	1.1274	0.8034	0.8014	2.0652	0.643
CAAR	-1.7334	-2.9092	-4.1277	8.446	10.1527	11.2801	12.0835	12.8849	14.9501	15.5931
F-stat	1.92	0.85	0.92	104.31***	1.76	0.76	0.35	0.36	2.71*	0.24



Month t	-3	-2	-1	0	1	2	3	4	5	6
AAR	0.6073	-0.0051	1.1879	-11.6883	1.643	2.2502	2.0891	-0.8249	3.0225	1.6188
CAAR	0.6073	0.6022	1.7901	-9.8982	-8.2552	-6.005	-3.9159	-4.7408	-1.7183	-0.0995
F-stat	0.2	0.01	0.84	93.96***	1.59	2.87*	2.76*	0.45	5.49**	1.58

Table 1: Descriptive statistics

The table presents descriptive statistics for the 360 monthly return observations (in%) for the period of 1972-2001, and each of the six 5-year subperiods for the ERI, MRI, and SP500 index. CV is the coefficient of variation, showing risk per unit of return. Low CV values are preferred to higher values.

Period: 1972 - 2001

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-16.53	13.17	0.98	3.91	3.99
Mortgage REITS	-24.58	32.49	0.44	5.77	13.11
SP500 Index	-24.23	15.51	0.95	4.49	4.73

Period: 1997 - 2001

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-9.91	9.07	0.06	3.74	62.33
Mortgage REITS	-23.14	13.25	1.04	7.38	7.10
SP500 Index	-15.59	9.33	1.08	5.21	4.82

Period: 1992 - 1996

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-5.58	9.89	1.32	3.10	2.35
Mortgage REITS	-8.09	11.82	1.30	2.98	2.29
SP500 Index	-4.50	7.24	1.18	2.81	2.38

Period: 1987 - 1991

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-16.53	10.38	0.52	3.89	7.48
Mortgage REITS	-10.84	8.96	-0.33	3.83	-11.61
SP500 Index	-24.23	12.63	1.19	5.49	4.61

Period: 1982 - 1986

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-3.84	9.64	1.67	2.82	1.69
Mortgage REITS	-11.08	13.41	1.24	3.87	3.12
SP500 Index	-8.64	11.44	1.50	4.13	2.75

Period: 1977 - 1981

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-12.96	11.87	1.47	4.41	3.00
Mortgage REITS	-12.69	15.86	0.73	5.18	7.10
SP500 Index	-10.24	10.12	0.64	4.20	6.56

Period: 1972 - 1976

	Minimum	Maximum	Mean	Std. Dev.	CV
Equity REITS	-15.09	13.18	0.39	5.08	13.03
Mortgage REITS	-24.58	32.49	-0.30	8.51	-28.37
SP500 Index	-12.23	15.51	0.39	4.92	12.62

Table 2: Calendar effects

Calendar effects are measured by regressing monthly returns on the market index over the period 1972 - 2001 on a complete set of 12 time dummy variable The results are reported for each of the six 5-year subperiods. The least squares estimate of the intercept is equal to the subperiod's average monthly return. Regression results for the ERI are reported in Panel A. Results for the MRI and SP500 index are reported in Panels B and C, respectively.

$$R_i = \alpha_i + \sum_{m=1}^{12} \beta_{im}\, TD_m$$

Panel A: ERI

	1972 - 1976		*1977 - 1981*		*1982 - 1986*		*1987 - 1991*		*1992 - 1996*		*1997- 2001*	
Month	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
January	6.0074	2.96***	1.8135	0.9100	1.5836	1.2700	3.3039	2.09**	1.3355	1.0100	-0.5480	-0.3400
February	1.1040	0.5400	-0.1656	-0.0800	-1.0996	-0.0880	1.0921	0.6900	0.8156	0.6100	-1.9366	-1.1900
March	0.2165	0.1100	-1.1104	-0.5600	1.4431	1.2500	1.5682	0.9900	-0.9708	-0.7300	0.5474	0.3400
April	-0.8176	-0.4000	-0.1682	-0.0800	0.5571	0.4500	0.0814	0.0500	-1.8576	-1.3900	1.8495	1.1400
May	-5.2294	-2.57**	-1.2812	-0.6400	-1.5543	-1.2400	-0.5794	-0.3700	1.0004	0.7500	1.0322	0.6400
June	4.2380	2.09**	2.7849	1.3900	-0.6859	-0.5500	0.8668	0.5500	-0.7814	-0.5900	1.6171	0.9900
July	0.0265	0.0100	1.4206	0.7100	-2.1371	-1.71*	0.6345	0.4000	0.2726	0.2000	-0.6215	-0.3800
August	-2.7654	-1.3600	1.6058	0.8100	-0.0311	-0.0200	-2.4912	-1.5700	0.3015	0.2300	-2.9121	-1.79*
September	0.4249	0.2100	-3.4971	-1.75*	-0.2132	-0.1700	-1.7353	-1.0900	0.3533	0.2700	1.2635	0.7800
October	-0.1014	-0.0500	-2.3652	-1.1800	2.3285	1.86*	-5.3454	-3.38***	-2.2831	-1.71*	-3.4010	2.09**
November	-3.7803	-1.86*	1.0639	0.5300	-0.3538	-0.2800	0.7121	0.4500	-1.6414	-1.2300	1.2032	0.7400
December	0.6767	0.3300	-0.1010	-0.0500	0.1629	0.1300	1.8924	1.1900	3.4552	2.59**	1.9059	1.1800
Mean	0.3089		1.4725		1.6715		0.5212		1.3183		0.5153	

Panel B: MRI

	1972 - 1976		*1977 - 1981*		*1982 - 1986*		*1987 - 1991*		*1992 - 1996*		*1997- 2001*	
Month	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
January	10.2756	2.85***	2.0040	0.9300	1.6155	0.9100	3.1167	1.82*	4.7764	2.66***	3.7497	1.2000
February	-0.4740	-0.1300	-2.2723	-1.0600	-1.0456	-0.5900	-0.5331	-0.3100	-0.4633	-0.2500	-0.6692	-0.2100
March	0.9401	0.2600	-1.5544	-0.7200	-0.5738	-0.3200	0.7502	0.4400	-1.5665	-0.8700	-0.2181	-0.0700
April	-5.5375	-1.5300	4.0935	1.90*	0.9376	0.5300	-0.8933	-0.5200	-2.1532	-1.1900	4.4882	1.4400
May	-1.9442	-0.5400	-0.2612	-0.1200	-1.5529	-0.8800	1.7473	1.0200	1.1498	0.6400	2.6149	0.8400
June	-0.8508	-0.2400	3.5827	1.6600	-1.4971	-0.8500	0.6109	0.3600	-0.7278	-0.4100	3.0506	0.9800
July	2.2847	0.6300	1.5533	0.7200	-0.7084	-0.4000	0.7891	0.4600	0.2029	0.1100	-1.3792	-0.4400
August	-6.2996	-1.74*	0.8156	0.3800	0.5614	0.3200	-0.4161	-0.2400	0.7475	0.4200	-9.6563	-3.09***
September	3.3964	0.9400	-3.3671	-1.5600	-0.7354	-0.4200	-2.0562	-1.2100	-0.0376	-0.0200	3.1264	0.9900
October	3.5353	0.9800	-4.3759	-2.03**	4.0939	2.32**	-3.4738	-2.03**	-0.7671	-0.4300	-3.9569	-1.2600
November	-4.3979	-1.2200	3.0361	1.4100	-0.1736	-0.0900	0.5022	0.2900	-1.3437	-0.7500	-1.2104	-0.3900
December	-0.9283	-0.2600	-3.2546	-1.5100	-0.9213	-0.5200	-0.1438	-0.0800	0.1827	0.1100	0.0602	0.0200
Mean	-0.3006		0.7264		1.2415		-0.3328		1.2979		0.0154	

Panel C: SP500 Index

	1972 - 1976		*1977 - 1981*		*1982 - 1986*		*1987 - 1991*		*1992 - 1996*		*1997- 2001*	
Month	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
January	4.2692	1.96*	-1.4111	-0.7600	0.4697	0.2700	3.1287	1.3300	0.5470	0.4600	0.5144	0.2100
February	0.4976	0.2300	-1.8919	-1.0200	-1.2379	-0.7200	1.5217	0.6400	-0.3167	-0.2700	0.3829	0.1600
March	0.5514	0.2500	-0.3702	-0.2000	0.5641	0.3300	0.2635	0.1100	-1.2619	-1.0600	0.0585	0.0200
April	-0.9393	-0.4300	1.7997	0.9700	0.8302	0.4800	-0.5122	-0.2200	0.1348	0.1100	-0.6077	-0.2500
May	-0.2425	-0.1100	-0.2751	-0.1500	-1.3645	-0.7900	2.4763	1.0500	0.9235	0.7800	0.5754	0.2400
June	0.7034	0.3200	1.3941	0.7500	0.0198	0.0100	-0.4472	-0.1900	-1.3693	-1.1600	2.5408	1.0400
July	-2.4769	-1.1400	1.8848	1.0200	-3.9004	-2.26**	2.3841	1.0100	0.0171	0.0100	-0.9364	-0.3800
August	-2.5631	-1.1800	-0.2717	-0.1500	4.4337	2.57**	-2.2976	-0.9700	0.3367	0.2900	-4.2116	-1.73*
September	-2.1728	-1.0000	-1.0213	-0.5500	-3.3471	-1.94*	-2.1862	-0.9300	0.3172	0.2700	-0.3396	-0.1400
October	3.8478	1.77*	-3.1597	-1.71*	2.5375	1.4700	-5.6977	-2.41**	0.2931	0.2500	-1.5072	-0.6200
November	-2.3553	-1.0800	4.1476	2.24**	1.2764	0.7400	-2.4619	-1.0400	0.7857	0.6700	1.9374	0.7900
December	0.8809	0.4100	-0.8251	-0.4400	-0.2813	-0.1600	3.8286	1.6200	-0.4073	-0.3500	1.5929	0.6500
Mean	0.3886		0.6413		1.5019		1.1860		1.1761		0.8337	

where:

R_i = the monthly return on the market index

α_i = the intercept term

β_{im} = the slope coefficient associated with the time dummy variable

TD_m = the time dummy variable, equal to one if the index return was generated in month m; zero otherwise

* significant at the 10%-level

** significant at the 5%-level

*** significant at the 1%-level

Table 3: Market Correlations

The correlation coefficients are computed pairwise for the equity Reits index (ERI), the mortgage Reits index (MRI), and the SP500 index on a 24-month rolling basis. Subsequently, the correlation coefficients are regressed on a "trend" variable, which increases by one with every monthly observation, and two time dummy variables. The intercept shows the estimated general correlation at the the 1972-2001 period. The trend varible indicates the change in the correlation coefficient over the entire 1972-1992 period. The time dummy variables TD_2 and TD_3 indicate additional trend changes between periods. TD_2 is equal to one starting January 1993, TD_3 is equal to one staring January 2000; zero otherwise.

Market Correlation			Trend		Trend*TD_2		Trend*TD_3	
between	Intercept	t-stat.	1976-2001	t-stat.	1993-2001	t-stat.	2000-2001	t-stat.
ERI and MRI	0.7517	35.56***	-0.0005	-3.95***	-0.0004	-4.59***	0.0002	2.49**
ERI and SP500	0.6627	28.89***	0.0001	0.31	-0.0011	-10.36***	-0.0005	-4.79***
ERI and T-bills	-0.5215	-15.08***	0.0021	9.23***	-0.0007	-4.65***	0.0004	2.84***
MRI and SP500	0.6831	23.87***	-0.0008	-4.29***	0.0001	0.33	-0.0005	-3.99***
MRI and T-bills	-0.4982	-14.51***	0.0017	7.54***	-0.0001	-0.64	-0.0001	-0.81

** significant at the 5%-level

*** significant at the 1%-level