

The Long-run Performance of REIT IPOs

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Abstract

Real estate and real estate investment trust performance has been examined in a number of papers. In general, there has been little evidence that real estate investment trusts (REITs) have earned significant positive abnormal returns based on REIT indices such as NAREIT and Wilshire. There is, however, empirical evidence that REITs exhibit positive abnormal returns in the case of initial public offerings (IPOs). While short-run REIT IPO behavior has been examined, the long-run behavior of REIT IPOs has not been examined within the context of a factor-based asset pricing model. We find that REIT IPOs generate long-run positive abnormal returns based on a sample of REIT IPOs. This sample period coincides with a period of two initial public offering waves for the REIT industry. We find that using a Fama and French (1993) type four-factor model for long-run IPO behavior, REIT IPOs generated significant and positive abnormal returns in the 1990s but not the 1980s. In comparison, the NAREIT and Wilshire Indices did not generate positive and significant abnormal returns over the same period.

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Introduction

Equity initial public offerings (IPOs) have been studied extensively. Ritter (1984, 1987) finds that IPOs are underpriced, giving investors who buy at the offer price a windfall. Ibbotson, Sindelar and Ritter (1988) summarize some of this early research and conclude that the average initial return for IPO's is 16.4%. Various reasons have been given why equity IPOs are underpriced. Underpricing may help a firm to raise additional financing in the future (Welch (1989)). Underpricing helps avoid the winner's curse to ensure that all securities are sold. Also, underpricing represents insurance against lawsuits

Real estate investment trust (REIT) IPOs have also been examined. However, the results are very different from those found for equity IPOs. Wang, Chan, and Gau (1992) find that REIT IPOs have negative initial performance in the 1970's and 1980's. This is in stark contrast to the positive abnormal returns found for equity IPOs. In the early 1990s, Ling and Ryngaert (1997) find that REIT IPOs have positive initial returns. However, the positive returns documented by Ling and Ryngaert (1997) of 3.6% are much lower than the 16.4% returns for equity IPOs.

In contrast to the positive initial returns for equity IPOs, Ritter (1991) and Loughran and Ritter (1995) find that IPOs have negative long-run abnormal performance over the 3 and 5 year periods following the initial offer. Long-run IPO behavior has not been examined in the case of REITs in a factor-based asset-pricing framework. The purpose of this paper is to examine the long-run performance of REIT IPOs. Given the evidence that REIT IPOs initially behave very differently from

equity IPOs, it is important to study the long-run behavior of the REIT IPOs to see if there are differences and try to determine why.

We collected a sample of returns generated by REITs that had their IPO from 1980 through 1999, inclusive. This sample period coincides with a period of three initial public offering waves for the REIT industry, 1985, 1993-1994 and 1997-1998. We find that (using a Fama and French model for long-run IPO behavior) REIT IPOs generated significant and positive abnormal returns in the 1990s but not the 1980s, which is supporting evidence of the Ling and Ryngaert [1997] argument that the REIT market had changed from the 1980s to the 1990s. As found in previous studies, the NAREIT and Wilshire REIT Indices did not generate positive and significant abnormal returns over the same period even though REIT IPOs did exhibit abnormal positive returns. Interestingly, however, when we examine equity and mortgage REIT IPOs separately, we find that only the mortgage REIT IPOs exhibited positive abnormal returns.

The rest of the paper proceeds as follows. The next section discusses reasons to examine the long-run performance of REIT IPOs. This section is followed by a discussion of methodology used and then describes the sample used in this study. Following that empirical results are discussed followed by a discussion of wealth effects. The final section of the paper concludes.

Hypotheses

There are several reasons to examine the long-run performance of REIT IPOs. Ritter (1991) provided the following reasons why we should be interested in long-run performance are

1. Investors would like to know about long-run abnormal returns in order to take advantage of trading strategies.
2. Finding abnormal performance would call into question the informational efficiency of the IPO market.
3. IPOs tend to come in waves so it would be interesting to know if there are windows of opportunity to successfully time the purchase of new issues.
4. In addition to the costs of going public, firms would like to know the long-run returns their investors earn and therefore better determine the firm's cost of capital.

The long-run behavior of REIT IPOs is particularly interesting given that there has been little evidence that real estate investment trusts (REITs) have earned significant positive abnormal returns based on REIT indices such as the NAREIT and Wilshire indices. For example, Titman and Warga (1986) and Chan, Hendershott and Sanders (1990) used arbitrage-pricing models to examine investment performance and found that evidence for abnormal investment performance was weak. While it may be difficult to generate successful trading strategies for seasoned REITs, the existence of long-run positive abnormal returns for REIT IPOs is promising.

Methodology

Rather than focus only on initial returns to IPOs, we seek to develop a better understanding of the long-run performance of REIT IPOs. Portfolio managers who are considering REITs for their portfolios may be interested in holding REITs for the long-term rather than simply capturing the burst in price after the REIT goes public.

Within the finance long-run performance literature, researchers generally use one of two methodologies. One methodology is to form matching samples to analyze long run IPO performance as

illustrated in Ritter (1991). The basic idea is to compare the returns of the asset under study with the returns to an out-of-sample matching asset. Implementing this methodology presents significant problems when analyzing REITs, however. Since the majority of existing REITs had their IPO during our sample period, developing an out-of-sample matching REIT portfolio would be impossible. Any REIT that would be a reasonable match would have been in the sample at some previous point during our study. For this reason we chose to implement the methodology of Fama and French (1993). We focus on using portfolios of REITs and testing their monthly returns against the Fama and French (1993) three-factor model to test for abnormal returns (with an adjustment for momentum). This is similar to the methodology of Loughran and Ritter (1995) and Brav and Gompers (1997). Although we do not form matching samples, we examine the performance of REIT indexes and REIT mutual funds over the same period of our sample to compare to the abnormal performance of the REIT IPOs.

Fama and French (1993) find that a three-factor model may explain the cross-section of stock returns. If the three-factor model is able to explain the cross-section of returns, we can use regressions to test long-run performance of REIT IPOs.¹ We regress the portfolios against the three Fama and French (1993) risk factors with the inclusion of Carhart's (1997) momentum variable. The factor is meant to measure the oft-examined momentum in stock prices as a variable that is important to explaining stock returns. We note that momentum is a significant explanatory variable for mutual fund returns as found by both Pastor and Stambaugh (2001) and Carhart (1997), and that REITs are similar to mutual funds in that they are both portfolios consisting of underlying instruments. The intercept of

¹ Real Estate studies that use factor pricing models include Chun, Sa-Aadu, and Shilling (2000), Gyourko and Keim (1992), Ling and Naranjo (1997), Liu and Mei (1992), Mei and Lee (1994), and Peterson and Hsieh (1997).

these regressions will be indicative of any long-run abnormal performance assuming the Fama French model with the inclusion of the momentum variable explains the cross-section of returns.

We begin by forming portfolios consisting of REIT IPOs completed during the sample period. We include a specific REIT in the portfolio for the N months immediately after its IPO. For consistency with prior studies (Loughran and Ritter (1995) and Brav and Gompers (1997)), we work with inclusion windows (i.e. values of N) of both 36 and 60 months. Additionally, we form both equally weighted and value weighted portfolios. This, combined with the 36 and 60- month inclusion windows, means that for any particular period we have four portfolios to examine. We then regress the monthly returns of each portfolio against the MOMENTUM, SMB, HML, and the Market risk factors:

$$RET_i = \mathbf{a} + \mathbf{b}_1 Market + \mathbf{b}_2 SMB + \mathbf{b}_3 HML + \mathbf{b}_4 MOMENTUM + \mathbf{e}_i, \quad (1)$$

where MARKET is the monthly excess return on the value weighted market portfolio. MARKET is meant to mimic the risk in returns related to market fluctuations. SMB is the monthly difference between the returns on small and big stock portfolios with about the same book to market equity. SMB is meant to mimic the risk in returns related to size. HML is the monthly difference in returns between a portfolio of high book-market firms and low book-market firms. This factor is meant to mimic the risk factor in returns related to book-market ratios. The MOMENTUM factor is Carhart's (1997) momentum factor.

The Data

We collected a sample of REITs that have completed an IPO over the last two decades from two sources (see Table 1.) NAREIT provided REIT IPO data for 1992 to 1999. Thompson Financial Services (SDC) provided REIT IPO data for 1980 to 1992. The offer price and size of issue was provided by NAREIT and SDC. We eliminated from the sample seven firms not listed on CRSP. This leaves 205 REITs in our sample during 1980-99. The initial return was calculated by using the first price from CRSP and the initial offer price. In addition to the initial return, daily and monthly returns, prices, volume and market capitalization were taken from CRSP. Our sample includes equity, mortgage and hybrid/other REITs. Table 2 shows the breakdown of the sample into equity and mortgage REITs by sub-sample period. As a percentage of the total REITs issued, mortgage REITs have decreased in popularity in the 1990's.

In our analysis, we examine the behavior of REIT IPOs over the entire sample period (1980-1999) as well as over selected sub-periods. We do this for several reasons. First, taken together the Wang, Chen, and Gau and the Ling and Ryngaert studies indicate that there were significant changes in the behavior of REIT IPO initial returns in the early 1990s. We test for similar changes in the long run REIT IPO behavior. Our first two sub-periods, therefore, are from 1980-1989 and from 1990-1994. The 1980-1989 sub-period gives us the best compatibility with the Wang, Chen, and Gau paper.² Similarly, the 1990-1994 sub-period gives us compatibility with the Ling and Ryngaert paper. Our final

² Although Wang, Chen, and Gau work with data from 1970-1987, we note that only 17 of the 87 REITs in their study had IPOs prior to 1980.

sub-period is from 1990-1999, which encompasses both of the recent major REIT IPO issuance waves.

Empirical Results

REIT Performance

Our sample of REIT IPOs verifies the results of Wang, Chan and Gau (1992) and Ling and Ryngaert (1997). As can be seen in Table 3, the 1984-1987 period was one of negative initial returns (indicating that there was actually IPO overpricing). In contrast, the 1992-1994 period has positive initial returns indicating the more traditional result of IPO underpricing. The 1997-1998 period, and particularly 1997, shows an even more pronounced underpricing; in 1997, the initial return on REIT IPOs was 7.26% with a t-statistic of 4.01 (based on 25 REIT IPOs). In 1998, the initial return has declined to 1.11%.

Although we observe that REIT IPO returns switched from negative in the 1980's to positive in the 1990's, the positive initial returns are still well below the average return for equity REITs. It is possible that the cash flows and risks of REITs are more predictable than for equities that would lead to more precise pricing at the initial offer.

Our main concern, however, is with the long-term returns to REIT IPOs, and so we use equation (1) to determine long-run abnormal returns for portfolios of REITs in our sample. Abnormal performance is indicated by a significant intercept. Table 4 shows the results of this regression for a five-year inclusion window. The first column shows the regression for the equally weighted portfolio and the second column shows the regression for the value-weighted portfolio. For the entire sample period, the

intercept is not statistically significant for either the equally weighted or the value weighted portfolios. Panel B shows evidence for the 1980-1989 sub-period of significant abnormal performance for the equally weighted portfolio, but statistically insignificant abnormal returns for the value weighted portfolio. Panel C, covering the second sub-period (1990-1994), shows some evidence of positive abnormal performance for the value-weight REIT IPO portfolio. Panel D, however, covering the entire 1990's (1990-1999) shows no evidence of abnormal returns.

We interpret the results of Table 4 to indicate that an equally weighted portfolio of REITs in the 1980's generated significantly long-run negative returns. This is in addition to the negative initial returns documented by Wang, Chan, and Gau (1992) and in Table 3 of this paper.³ The value weighted portfolios shows no abnormal performance in the 1980's.

In the 1990's a value weighted portfolio of REITs generated significantly positive abnormal returns at least through 1994.⁴ This is in addition to the positive initial returns documented by Ling and Ryngaert (1997) and in table 3 of this paper. Note that this positive long-term abnormal performance is in stark contrast to the negative long-term abnormal performance for equities as summarized by Loughran and Ritter (1995).

Table 5 repeats Table 4 except for a three-year window. The results are virtually the same for the three-year window, except that the positive abnormal performance for the 1990-1994 periods is statistically significant for the equally weighted REIT IPOs. Once again, the 1990-94 period shows

³ Since we use CRSP data when analyzing our results, the first day price that we work with is the close of trading price, not the initial trading price, so it does not include the first-day return. Since we are concerned with long-term returns we do not wish to make the assumption that investors are able to purchase at the offer price.

⁴ We actually found evidence of positive abnormal returns as late as 1997, but could not justify setting such an arbitrary date as a sub-period cutoff date.

statistically positive significant abnormal performance for the value weighted portfolio. The results for the 1980's are similar for both the 3-year and 5-year portfolios.

The results in Tables 4 and 5 indicate that there is evidence of long-run positive abnormal returns for REIT IPOs. While the results for the value weighted portfolios are essentially the same for the 3 and 5-year windows, the results for the equally weighted portfolio are stronger for the 3-year window. This result indicates that the smaller REIT IPO issues did not do as well over the five-year window while the larger REIT IPO issues maintained their performance from 3 to 5 years.

Table 6 examines the NAREIT and Wilshire REIT indices over the same time-periods as those used in Tables 3 and 4. The results in Tables 6 differ dramatically from the results found in Tables 4 and 5. From 1980 through 1999, the NAREIT index exhibited statistically significant negative abnormal returns (although the Wilshire index had a coefficient not statistically different from zero). In terms of sub periods, only the 1980 through 1989 sub-period had significantly negative abnormal returns for the NAREIT index. These results indicate that the REIT industry as a whole did not generate statistically significant alphas during the 1990s; only the REIT IPOs generated statistically significant alphas for some periods during the 1990s.

From table 6 we conclude that the negative long-run returns observed during the 1980's may have been a function of the REIT industry not captured by the four-factor model we have used. However, the results from the NAREIT and Wilshire indices in the 1990's indicates that the positive abnormal returns we observe from REIT IPOs are not being driven by industry factors which drive the REIT industry in general.

Mortgage vs. Equity REITs

In the preceding section we analyzed the REIT IPO returns without distinguishing between types of REITs. We allowed the portfolios to consist of both equity and mortgage REIT IPOs. Given that there are fundamental differences in these two classes of REITs, we seek to determine if there were differences in their IPO performance.

We begin by noting that Table 2 shows the distribution of REIT types within our sample, and that it is heavily dominated by equity REITs. For the entire sample, there are 163 equity REITs and 37 mortgage REITs. What is particularly striking is that during the 1980-1989 period the number of equity and mortgage REIT IPOs were relatively close, with 28 equity REIT IPOs and 17 mortgage REIT IPOs, but that in the 1990's that ratio changed dramatically with 133 equity REIT IPOs and only 20 mortgage REIT IPOs.

For this analysis, we use the same Fama-French methodology as before. We once again form portfolios of REIT IPOs, except that now for each time-period we form separate portfolios for equity and mortgage REIT IPOs. We once again form both equal and value weighted portfolios and then regress the returns of these portfolios against the Fama-French factors using the following Seemingly Unrelated Regression:

$$ERET_i = \mathbf{a} + \mathbf{b}_1 \text{Market} + \mathbf{b}_2 \text{SMB} + \mathbf{b}_3 \text{HML} + \mathbf{b}_4 \text{MOMENTUM} + \mathbf{e}_i \quad (2)$$

$$MRET_i = \mathbf{d} + \mathbf{g}_1 \text{Market} + \mathbf{g}_2 \text{SMB} + \mathbf{g}_3 \text{HML} + \mathbf{g}_4 \text{MOMENTUM} + \mathbf{w}_i,$$

where ERET equals the equity REIT IPO portfolio and MRET equals the mortgage REIT IPO portfolio and the other variables are as defined previously. We use the Seemingly Unrelated Regression to allow for correlation in the error terms and to test the difference in coefficients between the two equations.

We present the results of our analysis in Table 7. For this analysis we only use portfolios in which REITs stay in the portfolio for five years after the IPO, although the results are substantively similar for three-year portfolios as well.

Our first step is to examine the intercept terms of the regressions for evidence of abnormal returns, and later we examine the relative sensitivity of the portfolios to the Fama-French factors. For the entire 1980-1999 sample period, there is no evidence of abnormal returns, for either equity or mortgage REITs, regardless of portfolio construction. This is consistent with the results in Table 4. For the 1980-1989 sample period, both the equity and mortgage REIT equally-weighted portfolios have negative and significant intercepts, as does the mortgage REIT value weighted portfolio. The intercepts for the value-weighted portfolio are statistically different from each other. These negative intercepts are consistent with the negative returns reported by Wang, Chan, and Gau (1992) as well as Table 4.

The results for the 1990's periods paint a remarkably different picture. For the 1990-1994 sample period, there are no negative intercepts, and the value weighted mortgage REIT portfolio has a statistically significant positive intercept. Further, that intercept is statistically different from the equity REIT intercept. For the 1990-1999 period, the mortgage REIT IPO intercept is also statistically significant. However, it is not statistically different from the equity REIT IPO intercept. These results are quite interesting given the interest rate volatility that characterized much of the 1990's. From this data, we conclude that much of the overall REIT IPO performance indicated in Table 4 is driven by the mortgage REIT IPOs. Further, the fact that it is the value-weighted portfolio with the positive and significant intercept leads us to conclude that it is the larger mortgage REITs IPOs that drive the Table 4 results.

This conclusion raises an important question: is it appropriate to interpret the positive intercepts on the mortgage REIT regressions as evidence of abnormal performance? An alternative explanation is that the Fama-French factors do not fully explain mortgage returns, and, as such, the positive intercept is the manifestation of an omitted variables problem. To get at this we first compare the relative performance of the Fama-French factors in explaining both equity and mortgage REIT IPO returns. Since the differences in the intercepts between the mortgage and equity REIT IPO regressions are in the 1990's, we focus our discussion on those time frames.

We begin by noting that in every regression, the adjusted R^2 is higher for the equity REIT IPO portfolios than for the Mortgage REIT IPO portfolios. This indicates that the Fama-French factors explain more of the variation in returns for the equity REIT IPOs than for the mortgage REIT IPOs.

We next examine the relative sign and significance of the various factors themselves. We note that in every case the MARKET variable is statistically significant for both the equity and mortgage REIT IPO portfolios. Further, the SMB variable is significant for all portfolios with the exception of the 1980's. The HML variable, is significant in most of the regressions involving the equity REIT IPO portfolios, but that it is not significant in the equally weighted regressions involving the mortgage REIT IPOs in the 1990's. Finally, the MOMENTUM variable is generally significant in most of the regressions involving the equity REIT IPOs with the exception of 1980-89, and is not generally significant for the mortgage REIT IPO portfolios in the 1990's.

The fact that two of the factors that are significant in explaining equity REITs IPO returns are not significant in explaining mortgage REIT IPO returns motivates us to question the appropriateness of using the Fama-French factors for mortgage REITs. One potential question is whether the mortgage

REIT IPO portfolios are more closely linked to bonds than to stocks. Fama and French (1993) have proposed different factors to explain bond returns, and Peterson and Hsieh (1997) have found the factors useful in explaining the returns on mortgage REITs. These factors are TERM and PREM. The TERM variable is defined as the return on long-term government bonds minus the one-month Treasury-Bill rate. It provides a measure of the slope of the yield curve. PREM is the return on the market portfolio of long-term corporate bonds minus the return on long-term government bonds. The PREM factor provides a measure of the credit risk in corporate bonds.

We use these two factors as explanatory variables in regressions on the mortgage REIT IPO returns. The results of these regressions are in Table 8. We once again present results for the full sample period as well as for the various sub-samples. For each period, we present the results for two regressions. In the first regression we use only TERM and PREM as the independent variables. In the second regression, we use TERM, PREM, and the four Fama-French stock factors as independent variables.

We first analyze the results of the regressions that use only the TERM and PREM variables as independent variables. These results are the first column in each section of Table 8. In the majority of the regressions, the estimated coefficients for both TERM and PREM are statistically significant. PREM generally has an estimated coefficient that is twice as large as the TERM coefficient, indicating a greater sensitivity of the mortgage REIT returns to changes in the credit spread than in the slope of the yield curve.

We note that although the estimated coefficients on TERM and PREM are generally significant, the explanatory power of these regressions is very low. This can be seen most easily by comparing the

adjusted R^2 values in these regressions to those in Table 7. For example, in Panel A of Table 7, where we use the returns to the equally weighted mortgage REIT IPO portfolio as the independent variable, the regression has an adjusted R^2 value of .23. In the equivalent two-factor regression in Table 8, the R^2 is .06. For all of the two-factor regressions presented in Table 8, the corresponding Table 7 regression has an R^2 that is at least twice as large.⁵ This indicates that the four Fama-French factors may be important in explaining the mortgage REIT IPO returns. For this reason, we next estimate a regression equation utilizing Term, PREM, and the four Fama French stock factors as independent variables.

The adjusted R^2 for these regressions is higher than almost all of those presented in Table 7 and are dramatically higher than those of the bond-factor only regressions reported in the first column of Table 8.⁶ Examining the individual coefficients we note that the bond factors are less significant than they were in the first column of Table 8. In fact, the coefficient on TERM becomes statistically insignificant in several of the regressions, although PREM remains significant. This is consistent with the earlier finding that PREM explains more of the mortgage IPO returns than TERM.

The stock factors are generally slightly less significant than in Table 7. Momentum is positive and significant in the 1990-99 period but has a negative sign in all the other periods. We further note that while HML is not significant in the 1990-94 period it is significant for the 1990-99 period. Although their t-statistics are lower, the SMB and MARKET variables have coefficients that are of the same order of magnitude and sign as in Table 7, and they are generally significant for the same sub-periods

⁵ The explanatory power is so low, in fact, that the F test of the hypothesis that the coefficients are jointly zero cannot be rejected for the 1980-1989 time period. It can be easily rejected for all of the regressions in Table 7.

⁶ The one exception being the 1980-1989 period. When utilizing only the four stock factors, the regression has an adjusted R^2 of .33, but when using the six factors the regression has an adjusted R^2 of .32.

The abnormal returns for both the equal-weighted and value-weighted portfolios during the sample periods decrease slightly and are not as significant as the regressions in Table 7 with the exception of the 1990-99 period. The signs are consistent in both tables. This indicates that the addition of TERM and PREM to the four Fama French stock factors is useful in explaining returns. While the additional factors help explain the returns, there is still significant evidence of abnormal returns to mortgage REITs in the 1990s. These returns, however, disappeared by the mid to late 1990s.⁷

We conclude that when analyzing mortgage REIT IPOs, both stock factors and bond factors should be utilized. This is consistent with the notion that mortgage REITs have properties of both stocks and bonds.

Wealth Impact

Figures 1 and 2 show the wealth impact of investing in portfolios of REIT IPOs, the NAREIT index and the market portfolio. Figure 1 uses equally weighted portfolios of REIT IPOs completed in the prior three years. Note that this portfolio requires rebalancing and transactions costs which we have not accounted for. Over the entire sample, the market portfolio dominates the NAREIT index as well as the equally weighted portfolios of REIT IPOs. The portfolio of REIT IPOs completed in the prior three years finishes the 1999 period with a higher wealth balance than NAREIT. However, the NAREIT portfolio finishes ahead of the equally weighted portfolio of REIT IPOs completed in the last 5 years.

⁷For completeness, we also used the TERM and PREM factors in regressions with the equity REIT IPO portfolio returns as the dependent variable. Our expectations were that neither TERM nor PREM would be statistically significant, and they were not. These results are available from the authors.

Although not shown, if we do the same analysis for the 1990s, the equally weighted REIT IPOs do much better in comparison to the market portfolio and in fact lie above the market portfolio until the very end of the 1990s. The equally weighted REIT IPO portfolios dominate the NAREIT index for the 1990s.

Figure 2 shows the wealth effects of investing one dollar in the market portfolio, NAREIT index and value weighted REIT IPO portfolios. The REIT IPO portfolios lie above the market portfolio for much of the 1990s and do not drop below the market portfolio until the late 1990s. The REIT IPO portfolios always dominate the NAREIT index. If we do the same analysis for the 1990s, the REIT IPOs do much better in comparison to the market. The three-year portfolios end the period with a higher wealth amount than the market portfolio and the five-year portfolio has a higher wealth amount until the very last year of the sample period. The value weighted REIT IPO portfolios dominate the NAREIT index for the 1990s.

4. Summary and Conclusions

In this paper, we have examined the long-run behavior of REIT IPO returns. We find that there is no evidence of long-run abnormal returns to REIT IPOs during 1980-1999, but find that there is significant long-run abnormal returns in the 1990's, primarily during the early 1990's. Using Fama and French's asset pricing model with momentum as an added variable, we find no evidence of abnormal returns in the NAREIT or Wilshire REIT indices. We conclude that a substantial amount of the

abnormally positive returns on REITs that occurred in the 1990s was related to long-run performance of REIT IPOs, not existing REITs.

We also examine the performance of equity and mortgage REITs. We find that even in the 1990s there is no evidence of long-run abnormal returns for equity REITs, but that there is evidence of long-run abnormal returns for mortgage REITs. We conclude that the overall long-term REIT IPO returns were largely driven by mortgage, not equity REITs. This is somewhat surprising given the significantly larger number of equity REITs that were issued compared to the number of mortgage REITs.

Finally, we examine the appropriateness of using the Fama French factors when evaluating mortgage REIT returns. We note that while REITs are generally viewed to be stock-like, mortgage REITs have properties of both stocks and bonds. We find that including the Fama French bond factors in the regressions considerably increases their explanatory power.

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Table 1. Description of Portfolio Returns, Economic Variables and Instruments.

| Variable | Definition | Source |
|-----------------|---|---|
| REIT IPOs | Real estate investment trusts: initial public offering index | CRSP, NAREIT, Thomson Financial Securities Data |
| NAREIT | NAREIT's REIT index | NAREIT |
| Wilshire | Wilshire's REIT index | Ibbotson |
| MARKET | Fama and French's Market Variable (EWCRSP minus the risk-free rate) | Ibbotson |
| SMB | Fama and French's size variable (small minus big) | Ibbotson |
| HML | Fama and French's book-to-value variable (high minus low) | Ibbotson |
| MOMENTUM | Carhart's (1997) Momentum variable | Ken French's Website |
| TERM | Fama and French's term variable (Long Term Government bond return minus 3 month T Bill return) | Ibbotson |
| PREM | Fama and French's credit premium variable (Long Term Corporate Bond Market Portfolio – Return on Long Term Government bond) | Ibbotson |

Table 2. Composition of REIT sample by type of REIT.

| Total Sample | # of REITs |
|-------------------------|-------------------|
| Equity | 161 |
| Mortgage | 37 |
| Hybrid/Blind Pool/Other | 7 |
| 1980-89 | |
| Equity | 28 |
| Mortgage | 17 |
| Hybrid/Blind Pool/Other | 4 |
| 1990-94 | |
| Equity | 91 |
| Mortgage | 6 |
| Hybrid/Blind Pool/Other | 1 |
| 1990-99 | |
| Equity | 133 |
| Mortgage | 20 |
| Hybrid/Blind Pool/Other | 3 |

Table 3. Initial Returns on REIT IPOs by Various Time Periods.

| Time Period | Initial Return | t-stat | Observations | Ave First Week Volume in 1,000's |
|---------------------------|-----------------------|---------------|---------------------|---|
| Entire Sample | 2.00% | 4.34 | 205 | |
| Wang/Chan/Gau (1980-1988) | -1.61% | -2.09 | 49 | 790 |
| Ling/Ryngaert (1990-1994) | 2.70% | 4.95 | 98 | 3,073 |
| After 1994 | 3.87% | 3.63 | 58 | 5,117 |

| By Year | | | | |
|----------------|--------|-------|----|--------|
| 1980 | -4.69% | . | 1 | . |
| 1981 | . | . | 0 | . |
| 1982 | 0.62% | . | 1 | 786 |
| 1983 | 6.45% | . | 1 | 259 |
| 1984 | -7.82% | -1.12 | 4 | 317 |
| 1985 | -2.42% | -2.33 | 21 | 1,172 |
| 1986 | -0.26% | -0.30 | 8 | 389 |
| 1987 | -0.30% | -0.63 | 5 | 1,101 |
| 1988 | 0.52% | 1.38 | 8 | 299 |
| 1989 | . | . | 0 | . |
| 1990 | . | . | 0 | . |
| 1991 | -0.63% | -1.00 | 3 | 582 |
| 1992 | 1.03% | 1.10 | 7 | 1,525 |
| 1993 | 2.68% | 3.52 | 48 | 3,847 |
| 1994 | 3.26% | 3.42 | 40 | 2,621 |
| 1995 | 2.07% | 1.25 | 8 | 1,627 |
| 1996 | 0.74% | 0.21 | 6 | 3,606 |
| 1997 | 7.26% | 4.01 | 25 | 7,010 |
| 1998 | 1.11% | 0.71 | 18 | 4,104 |
| 1999 | 2.06% | . | 1 | 10,012 |

Table 4. Four Factor Regressions for REIT IPOs in their first five years after going public. The first column shows the results of a regression using an equally weighted portfolio of REIT IPOs within the first 5 years of going public. The second column shows the results of a regression using a value weight portfolio of REIT IPOs within the first 5 years of going public. The dependent variable is the monthly return of a portfolio. The independent variables MARKET, SMB, HML are as described in Fama and French (1993). MOMENTUM is as described in Carhart(1997). White's method (1980) is used to correct for heteroskedasticity. T-statistics are the coefficients of the regressions divided by their respective standard errors and are in parentheses.

| Panel A. Entire Sample period (1980 – 1999). There are 230 observations in these regressions. The average number of REITs per month is 46.4. | | |
|---|-----------------------|-----------------------|
| | Equal Weighted Sample | Value weighted Sample |
| Intercept | -.0033 (-1.36) | .0003 (.13) |
| Market | .5248 (9.53***) | .5606 (8.67***) |
| SMB | .4431 (5.45***) | .4038 (4.35***) |
| HML | .5064 (5.21***) | .5280 (4.48***) |
| Momentum | -.0030 (-.04) | .0609 (.69) |
| Adjusted R ² | .30 | .29 |
| Panel B. 1980 – 1989 Sample Period. This covers the Wang/Chan/Gau study. There are 110 observations used in these regressions. The average number of REITs per month is 19.6. | | |
| Intercept | -.0078 (-2.21**) | -.0039 (-1.08) |
| Market | .5029 (6.55***) | .4978 (6.29***) |
| SMB | .2640 (1.78*) | .1496 (.96) |
| HML | .5308 (3.22) | .4477 (2.80***) |
| Momentum | .0213 (.16) | -.0071 (.05) |
| Adjusted R ² | .20 | .19 |

Panel C. 1990 – 1994 Sample Period. This covers the Ling/Ryngaert study. There are 60 observations used in these regressions. The average number of REITs per month is 36.9.

| | | |
|-------------------------|--------------------|--------------------|
| Intercept | .0027 (.60) | .0086 (1.98*) |
| Market | .5768 (4.94***) | .6678 (6.35***) |
| SMB | .6450 (4.64***) | .5823 (3.86***) |
| HML | .3013 (2.06**) | .4241 (1.68*) |
| Momentum | .0284 (.19) | .2898 (2.12**) |
| Adjusted R ² | .39 | .40 |

Panel D. 1990 – 1999 Sample Period. There are 120 observations used in these regressions. The average number of REITs per month is 70.58.

| | | |
|-------------------------|---------------------|---------------------|
| Intercept | 0.0004 (0.13) | 0.0037 (1.26) |
| Market | 0.5653 (7.57***) | 0.6521 (8.16***) |
| SMB | 0.5488 (5.69***) | 0.5714 (5.47***) |
| HML | 0.5382 (4.66***) | 0.6628 (4.10***) |
| Momentum | -0.0194 (-0.19) | 0.1381 (1.46) |
| Adjusted R ² | .42 | .41 |

Table 5. Four Factor Regressions for REIT IPOs in their first three years after going public. The first column shows the results of a regression using an equally weighted portfolio of REIT IPOs within the first 3 years of going public. The second column shows the results of a regression using a value weight portfolio of REIT IPOs within the first 3 years of going public. The dependent variable is the monthly return of a portfolio. The independent variables MARKET, SMB, HML are as described in Fama and French (1993). MOMENTUM is as described in Carhart(1997). White's method (1980) is used to correct for heteroskedasticity. T-statistics are the coefficients of the regressions divided by their respective standard errors and are in parentheses.

Panel A. Entire Sample period (1980 – 1999). There are 230 observations in these regressions. The average number of REITs per month is 31.

| | Equal Weighted Sample | Value weighted Sample |
|-------------------------|-----------------------|-----------------------|
| Intercept | -.0021 (-.79) | .0005 (.18) |
| Market | .5213 (7.79***) | .5766 (8.09***) |
| SMB | .4580 (4.53***) | .4925 (4.72***) |
| HML | .4806 (4.34***) | .5041 (4.65***) |
| Momentum | .0395 (.41) | .0192 (.20) |
| Adjusted R ² | .25 | .28 |

Panel B. 1980 – 1989 Sample Period. This covers the Wang/Chan/ Gau study. There are 110 observations in these regressions. The average number of REITs per month is 14.9.

| | | |
|-------------------------|---------------------|--------------------|
| Intercept | -.0087 (-2.34**) | -.0048 (-1.28) |
| Market | .4896 (5.40***) | .4943 (5.72***) |
| SMB | .2908 (1.80*) | .1662 (1.03) |
| HML | .5309 (2.90***) | .4464 (2.70***) |
| Momentum | .0101 (.07) | -.0108 (-.08) |
| Adjusted R ² | .17 | .17 |

Panel C. 1990 – 1994 Sample Period. This covers the Ling/Ryngaert study. There are 60 observations in these regressions. The average number of REITs per month is 27.3.

| | | |
|-------------------------|--------------------|--------------------|
| Intercept | .0097 (2.06**) | .0104 (1.84*) |
| Market | .7104 (6.12***) | .7502 (6.04***) |
| SMB | .4829 (3.26***) | .7890 (3.81***) |
| HML | .1801 (1.28) | .4027 (2.34**) |
| Momentum | .1871 (1.22) | .0952 (.50) |
| Adjusted R ² | .38 | .37 |

Panel D. 1990 – 1999 Sample Period. There are 120 observations in these regressions. The average number of REITs per month is 45.8.

| | | |
|-------------------------|---------------------|---------------------|
| Intercept | 0.0028 (0.80) | 0.0047 (1.29) |
| Market | 0.5918 (6.50***) | 0.6971 (8.42***) |
| SMB | 0.5645 (4.25***) | 0.6943 (6.17***) |
| HML | 0.5217 (4.00***) | 0.6310 (5.26***) |
| Momentum | 0.0742 (0.54) | 0.0664 (0.59) |
| Adjusted R ² | .34 | .40 |

Table 6. Four Factor Regressions for REIT indexes. The first column shows the results of a regression using the NAREIT index. The second column shows the results of a regression using the Wilshire REIT index. The dependent variable is the monthly return of the index. The independent variables MARKET, SMB, HML are as described in Fama and French (1993). MOMENTUM is as described in Carhart(1997). White’s method (1980) is used to correct for heteroskedasticity. T-statistics are the coefficients of the regressions divided by their respective standard errors and are in parentheses.

| Panel A. Entire Sample period (1980 – 1999). There are 240 observations in these regressions. | | |
|---|----------------------|---------------------|
| | NAREIT index | Wilshire REIT index |
| Intercept | -.0029 (-1.86*) | -.0026 (-1.38) |
| Market | .6392 (16.27***) | .6883 (15.79***) |
| SMB | .4922 (8.57***) | .5554 (8.34***) |
| HML | .5498 (7.65***) | .5610 (7.18***) |
| Momentum | -.0135 (-.28) | .0010 (.02) |
| Adjusted R ² | .58 | .56 |
| Panel B. 1980 – 1989 Sample Period. This covers the Wang/Chan/Gau study. There are 120 observations in these regressions. | | |
| Intercept | -.0039 (-2.12***) | -.0005 (-.19) |
| Market | .6059 (12.85***) | .6992 (11.85***) |
| SMB | .3968 (5.19***) | .5886 (5.83***) |
| HML | .4337 (5.00***) | .4066 (3.64***) |
| Momentum | -.0360 (-.55) | -.0179 (-.24) |
| Adjusted R ² | .61 | .64 |

Panel C. 1990 – 1994 Sample Period. This covers the Ling/Ryngaert study. There are 60 observations in these regressions.

| | | |
|-------------------------|--------------------|--------------------|
| Intercept | -.0009 (-.26) | -.0042 (-1.09) |
| Market | .5823 (7.06***) | .6211 (6.35***) |
| SMB | .5669 (4.78***) | .6975 (4.70***) |
| HML | .3734 (4.78***) | .4917 (2.78***) |
| Momentum | .0624 (2.12**) | .0981 (.71) |
| Adjusted R ² | .51 | .49 |

Panel D. 1990 – 1999 Sample Period. There are 120 observations in these regressions.

| | | |
|-------------------------|---------------------|---------------------|
| Intercept | -0.0017 (-0.69) | -0.0032 (-1.17) |
| Market | 0.6155 (9.88***) | 0.6397 (9.54***) |
| SMB | 0.4788 (5.88***) | 0.5463 (5.98***) |
| HML | 0.6106 (5.25***) | 0.6769 (6.08***) |
| Momentum | -0.0368 (-0.49) | 0.0062 (0.08) |
| Adjusted R ² | .51 | .47 |

Table 7. Seemingly Unrelated Regressions for REIT IPOs in their first five years after going public split by Equity and Mortgage REITs. The first and second columns show the results of a seemingly unrelated regression using equally weighted portfolios of equity and mortgage REIT IPOs within the first 5 years of going public. The third and fourth columns show the results of a seemingly unrelated regression using value weighted portfolios of equity and mortgage REIT IPOs within the first 5 years of going public. The sixth column shows the results of a regression using a value weighted portfolio of mortgage REIT IPOs within the first 5 years of going public. The dependent variable is the monthly excess return of a portfolio. The independent variables MARKET, SMB, HML are as described in Fama and French (1993). MOMENTUM is as described in Carhart (1997). ***,**,* indicate statistical difference from zero at the 1, 5, and 10 percent level. # indicates coefficients which are statistically different from each other at least the 10 percent level.

Panel A. Entire Sample period (1980 – 1999). There are 230 observations in the equity REIT portfolios and 226 observations in the mortgage REIT portfolios. The average number of equity REITs per month is 37.7 and mortgage REITs is 8.7.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|--------------------|---------------------------|--------------------|
| | Equity REITs | Mortgage REITs | Equity REITs | Mortgage REITs |
| Intercept | -.0033 (-1.30) | -.0031 (-.90) | -.0003 (-.10) | .0019 (.58) |
| Market | .5386 (8.68***) | .5539 (6.29***) | .5254 (7.44***) | .6114 (7.04***) |
| SMB | .4212 (5.02***) | .4874 (3.44***) | .3919 (4.06***) | .4746 (3.39***) |
| HML | .5827 (5.35***) | .3774 (2.50**) | .4782 (3.80***) | .4573 (2.74***) |
| Momentum | .0687# (.83) | -.1867# (1.24) | .1102# (1.24) | -.1196# (-.83) |
| Adjusted R ² | .28 | .23 | .25 | .24 |

Panel B. 1980 – 1989 Sample Period. This covers the Wang/Chan/Gau study.. There are 110 observations in the equity REIT portfolios and 106 observations in the mortgage REIT portfolios. The average number of equity REITs per month is 12.3 and mortgage REITs is 7.3.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|----------------------|---------------------------|----------------------|
| | Equity REITs | Mortgage REITs | Equity REITs | Mortgage REITs |
| Intercept | -.0065 (-1.71*) | -.0118 (-2.80***) | -.0024# (-.64) | -.0094# (-2.27**) |
| Market | .4624# (6.00***) | .7356# (6.78***) | .4315# (5.25***) | .7550# (7.90***) |
| SMB | .2452 (1.64) | .3135 (1.60) | .1323 (.84) | .2872 (1.59) |
| HML | .4996 (2.77***) | .7242 (3.56***) | .3411# (1.94*) | .6740# (3.20***) |
| Momentum | .0570 (.44) | -.3065 (-1.89*) | .0449 (.34) | -.2955 (-1.80*) |
| Adjusted R ² | .16 | .33 | .14 | .34 |

Panel C. 1990 – 1994 Sample Period. This covers the Ling/Ryngaert study. There are 60 observations in the equity REIT portfolios and 60 observations in the mortgage REIT portfolios. The average number of equity REITs per month is 27.5 and mortgage REITs is 9.4.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|--------------------|---------------------------|---------------------|
| | Equity REITs | Mortgage REITs | Equity REITs | Mortgage REITs |
| Intercept | .0014 (.30) | .0034 (.57) | .0042# (.98) | .0161# (2.76***) |
| Market | .6459 (4.60***) | .5476 (2.56**) | .6332 (4.82***) | .6540 (2.68***) |
| SMB | .6328 (4.76***) | .5335 (2.32**) | .6116 (3.55***) | .4510 (1.71*) |
| HML | .5180# (2.63**) | .0407# (.20) | .3412 (1.25) | .5241 (1.78*) |
| Momentum | .2649# (1.71*) | -.3475# (-1.44) | .4239# (2.89***) | -.1384# (-.53) |
| Adjusted R ² | .39 | .24 | .37 | .20 |

Panel D. 1990 – 1999 Sample Period. There are 120 observations in the equity REIT portfolios and 120 observations in the mortgage REIT portfolios. The average number of equity REITs per month is 60.9 and mortgage REITs is 9.7.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|---------------------|---------------------------|---------------------|
| | Equity REITs | Mortgage REITs | Equity REITs | Mortgage REITs |
| Intercept | -0.0004 (-0.15) | 0.0018 (0.38) | 0.0015 (0.44) | 0.0090 (1.90*) |
| Market | 0.6361 (7.87***) | 0.4335 (3.48***) | 0.6460 (7.22***) | 0.5305 (4.20***) |
| SMB | 0.5329 (5.26***) | 0.5701 (3.65***) | 0.5600 (4.99***) | 0.5735 (3.62***) |
| HML | 0.6984# (5.69***) | 0.2237# (1.18) | 0.6405 (4.72***) | 0.4082 (2.13**) |
| Momentum | 0.0897# (1.00) | -0.1564# (-1.13) | 0.1896# (1.90*) | -0.0582 (-0.41) |
| Adjusted R ² | .42 | .19 | .39 | .20 |

Table 8. Factor Regressions for Mortgage REIT IPOs in their first five years after going public. The first and second columns show the results of regressions using an equally weighted portfolio of mortgage REIT IPOs within the first 5 years of going public. The third and fourth columns show the results of regressions using a value weighted portfolio of mortgage REIT IPOs within the first 5 years of going public. The dependent variable is the monthly excess return of a portfolio. The independent variables MARKET, SMB, HML, TERM and PREM are as described in Fama and French (1993). MOMENTUM is as described in Carhart (1997). White's method (1980) is used to correct for heteroskedasticity. T-statistics are the coefficients of the regressions divided by their respective standard errors and are in parentheses. ***, **, * indicate statistical difference from zero at the 1, 5, and 10 percent level.

| Panel A. Entire Sample period (1980 – 1999). There are 226 observations in the mortgage REIT portfolios. The average number of mortgage REITs per month is 8.7. | | | | |
|---|-----------------------------|----------------------|---------------------------|---------------------|
| | Equally weighted Portfolios | | Value weighted Portfolios | |
| Intercept | -.0017 (-.51) | -.0038 (-1.08) | .0042 (1.24) | .0013 (.40) |
| TERM | .6019 (3.47***) | .3504 (1.90*) | .6796 (3.83***) | .3951 (2.31**) |
| PREM | 1.8079 (3.30***) | 1.0440 (2.54**) | 1.7344 (3.01***) | .9400 (2.30**) |
| Market | | .4915 (4.54***) | | .5342 (5.35***) |
| SMB | | .4849 (3.03***) | | .4973 (3.18***) |
| HML | | .3375 (3.60***) | | .4084 (2.57**) |
| Momentum | | -.1812 (-1.24) | | -.1223 (-.87) |
| Adjusted R ² | .06 | .25 | .07 | .26 |
| Panel B. 1980 – 1989 Sample Period. This covers the Wang/Chan/Gau study. There are 106 observations in the mortgage REIT portfolios. The average number of mortgage REITs per month is 7.3. | | | | |
| | Equally weighted Portfolios | | Value weighted Portfolios | |
| Intercept | -.0065 (-1.27) | -.0127 (-3.04***) | -.0041 (-.79) | -.0101 (-2.45**) |
| TERM | .4262 (1.96**) | .2090 (1.25) | .4297 (1.98*) | .2038 (1.21) |
| PREM | .9382 (1.82*) | .5631 (1.45) | .7820 (1.47) | .4057 (.99) |
| Market | | .7092 (6.22***) | | .7241 (7.33***) |
| SMB | | .3293 (1.48) | | .3284 (1.54) |
| HML | | .7056 (3.45***) | | .6630 (3.11***) |
| Momentum | | -.2970 (-1.80) | | -.2897 (-1.75*) |
| Adjusted R ² | .02 | .32 | .02 | .34 |

Panel C. 1990 – 1994 Sample Period. This covers the Ling/Ryngaert study. There are 60 observations in the mortgage REIT portfolios. The average number of mortgage REITs per month is 9.4.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|---------------------|---------------------------|--------------------|
| Intercept | -.0015 (-.25) | .0009 (.16) | .0135 (2.32**) | .0140 (2.45**) |
| TERM | 1.5553 (4.07***) | .4782 (1.00) | 1.9455 (4.41***) | 1.0513 (2.30**) |
| PREM | 6.0551 (4.13***) | 3.5909 (2.66***) | 5.7809 (3.57***) | 3.6890 (2.54**) |
| Market | | .6637 (2.44**) | | .5308 (1.85*) |
| SMB | | .2549 (1.11) | | .2827 (1.09) |
| HML | | .0626 (.28) | | .4469 (1.51) |
| Momentum | | -.2267 (-.80) | | -.1313 (-.48) |
| Adjusted R ² | .14 | .28 | .17 | .22 |

Panel D. 1990 – 1999 Sample Period. There are 120 observations in the mortgage REIT portfolios. The average number of mortgage REITs per month is 9.7.

| | Equally weighted Portfolios | | Value weighted Portfolios | |
|-------------------------|-----------------------------|----------------------|---------------------------|----------------------|
| Intercept | 0.0017 (0.40) | 0.0023 (0.50) | 0.0101 (2.38**) | 0.0097 (2.278*) |
| TERM | 1.1861 (4.38***) | 0.1983 (1.00) | 1.4235 (5.27***) | 0.2471 (1.37) |
| PREM | 4.5467 (5.95***) | 0.5243 (2.76***) | 4.7865 (5.95***) | 0.5448 (2.95***) |
| Market | | 0.1141 (0.65) | | 0.2603 (1.26) |
| SMB | | -0.1648 (-0.91) | | -0.0852 (-0.50) |
| HML | | 0.97291 (2.28**) | | 1.14541 (3.24***) |
| Momentum | | 3.20413 (3.13***) | | 3.4208 (3.71***) |
| Adjusted R ² | .17 | .26 | .19 | .28 |

Figure 1. Wealth Effect of Investing \$1 in different portfolios in 1980. (Does not take transactions costs into account)

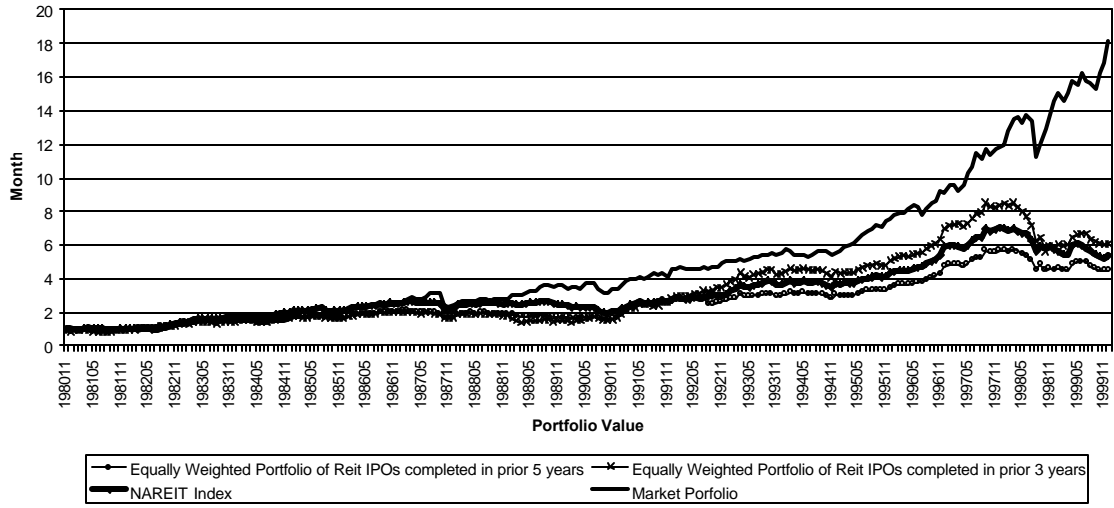


Figure 2. Wealth Effect of investing \$1 in different portfolios in 1980. (Does not take transactions costs into account)

