Institutional Investor Impact on Equity REIT Performance

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Institutional investors have paid increasingly close attention to publicly traded Real Estate Investment Trusts (REITs) since the flurry of initial public offerings began in earnest in 1993. Quite naturally, institutional investors have focused on REITs with larger market capitalizations in search of liquidity and of timely real estate price discovery that they found lacking in direct and indirect real estate investing in the previous decade.

The evidence of this study, however, is that REIT returns track corresponding returns on their underlying real estate portfolios less efficiently when REITs attract significant institutional investor interest, and also that institutional investors as a group tend to move in and out of large capitalization REITs in ways that negatively impact their overall returns.

This study approaches these issues by examining evidence concerning persistence on the part of relative performance in REIT returns rather than in the returns themselves. Any evidence of persistence is relevant to investors because there should be no such evidence in an efficient market.[1] More precisely, well-established economic theory predicts that all investment information about future economic asset behavior has been fully factored into current asset pricing in a liquid and informationally efficient market. This means that future asset price changes should only be consequences of economic events not currently foreseeable by investors or investment managers, which implies that investment performance in one sample period should not be a predictor of investment performance in the next sample period.[2] Thus any evidence to the contrary is evidence of pricing inefficiency in market transactions during the test period.

Serial independence is used in this study to describe asset returns for which return performance in each sample period is unrelated to the return performance in the next sample period. *Positive (negative) performance persistence* is used to describe asset returns for which return performance in each sample period is more (less) likely to be observed in the next sample period than would be

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1 Jensen [1969] examined the tendency of equity mutual funds to outperform the market in successive periods by dividing fund returns into two subgroups: above-market and below-market returns. Consistent with market efficiency, he found no evidence of persistence in above-market or below-market performance.

2 In the strictest sense, persistence in return performance is not quite the same as persistence in the value of individual asset returns. Persistence in return performance can be generated in efficient markets if expected asset returns vary sufficiently across the investment universe. However, computer simulation has shown that the cross-sectional standard deviation in *expected* annual REIT returns (i.e. *ex ante* returns) would have to be more than 7% to generate the degree of performance persistence observed for annual REIT returns in this study under the assumption that the REIT market is efficient. This implies that the difference between the highest and lowest *expected* annual REIT returns would be more than 28% (i.e. four standard deviations), which is so far in excess of the observed spread in annual REIT return estimates by investment analysts and advisors that this explanation can be dismissed. Furthermore, if performance persistence could be explained by cross-sectional variation in expected returns, then observed persistence in REIT return data would be the same regardless of whether annual or quarterly returns were used to test for persistence. However, as this study shows, the substitution of quarterly returns for annual returns totally changes the persistence behavior observed in REIT returns.

expected if the returns were serially independent.[3] In this terminology, this study tests efficiency in REIT pricing by examining serial persistence in equity REIT returns during the ten-year interval January 1987 through December 1996 for monthly, quarterly, and annual sampling frequencies, and for divisions into large and small market capitalization subclasses.

In each case, the cross-sectional data are grouped into quartiles to test for serial/temporal persistence in REIT quartile rankings. Because we group the data into quartiles, the theoretical probability of serial persistence is 25% if consecutive quartile rankings for each REIT are serially independent, the typical assumption used by researchers. Thus, statistically significant departures from 25% are deemed evidence of persistence.

This work extends to liquid markets the results of earlier research (see Young and Graff [1997a, b]), which find statistically significant serial persistence in private equity real estate annual returns from the NCREIF data base. Some researchers have suggested that the surprising persistence reported in the earlier work is the result of spuriously low volatility in observed returns due to appraisal smoothing. This study, however, observes the same persistence behavior in returns from market-priced securities and is not subject to that criticism.

REIT Data

Data for this study are compiled from daily stock price, dividend, and market capitalization data between 1987 and 1996 on NYSE-listed and Amex-listed equity REITs supplied by IDC, a major vendor of securities data. We compute monthly, quarterly, and annual returns for each REIT from the daily IDC data.[4]

From January 1993 to January 1994 the equity REIT universe expanded from 68 to 100 securities as shown in Exhibit 1. For this reason, and because some market analysts have suggested that the recent crop of equity REITs is different from the earlier generation of REITs, we also divide the data set according to 1987-through-1992 and 1993-through-1996 subintervals. Exhibit 1 shows the number of NYSE- and Amex-listed equity REITs with daily reported transaction prices and dividends for the complete month of January of each year.

The $100 million capitalization level is a critical hurdle from the perspective of institutional investors. Most institutions regard REITs with lower capitalizations as inappropriate for their investment portfolios, while REITs with capitalizations of $100 million and above are generally included in the universe of potential investment opportunities. Implicitly acknowledging this criterion, several prominent published indexes of REIT performance use $100 million as the threshold for inclusion in the index. Accordingly, we also divide the data set into two size categories: “large capitalization” REITs with a market capitalization of $100 million or more, and “small capitalization” REITs with less than $100 million.

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3 If *performance persistence* appears without additional description, *positive* should be understood.

4 In two instances, a group of equity REITs is sponsored by a single manager, each of which employs essentially the same investment strategy for all REITs in its group. Within each group the prices marched in lock step with one another and returns were virtually identical. Accordingly, we combined the three issues of Meridian Point Realty Trust into a single data series. Similarly, we combined returns for fifteen Public Storage issues into a single return series.

Persistence Methodology

We initially group returns from each sample period into quartiles. Then we designate returns in the highest (i.e., first) and lowest (i.e., fourth) quartiles as our proxy for extreme returns, and returns in the two middle (i.e., second and third) quartiles as our proxy for moderate returns.[5]

Our tests and methodology are the same as in Young and Graff [1997a, b], except that in the study of liquid market data it becomes possible to perform the tests for several different sampling frequencies. Accordingly, we test for serial persistence separately in the subclasses of extreme and moderate returns as in the previous studies, but this time for three different cases: annual, quarterly, and monthly sample periods.

For each choice of monthly, quarterly, or annual sample frequency, we record the quartile rank for each REIT in every sample period. Successful performance persistence is then defined as the same quartile rank in the subsequent period, and unsuccessful performance persistence as a different quartile rank in the subsequent period.[6]

Our null hypothesis assumes that the quartiles within which REIT returns fall are independent across time. Independence across time implies that the probability of a return quartile rank remaining the same from one sample period to the next is 25%. Thus, statistically significant departures from 25% are considered statistical justification for rejection of the null hypothesis, i.e., evidence of serially dependent performance persistence.

For each sample period, we determine the 25th, 50th (median), and 75th percentile breakpoints and arrange the quartile groupings as follows: returns greater than the 75th percentile breakpoint constituted the 1st Quartile, returns greater than or equal to the 50th percentile breakpoint and less than or equal to the 75th percentile breakpoint constituted the 2nd Quartile, returns greater than or equal to the 25th percentile breakpoint and less than the 50th percentile breakpoint constituted the 3rd Quartile, and returns less than the 25th percentile breakpoint constituted the 4th Quartile.

Because the number of REIT returns is usually not evenly divisible by four, the number of sample returns varies between quartiles. When this is the case, and due to the way the quartile breakpoints are defined, there is a slight bias against the extreme quartiles and toward the moderate quartiles: primarily toward the 2nd Quartile, and secondarily toward the 3rd Quartile.

The monthly return data exhibit a considerable number of return values that are precisely "zero." As 0% coincides with the median cross-sectional REIT return in all but a few cases, our quartile grouping scheme generates upward bias in the size of the 2nd Quartile group in every monthly data set (and offsetting downward bias in the sizes of the three remaining quartile

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5 If we were to perform persistence tests directly on the extreme and moderate returns, then a REIT return that falls within one extreme quartile during any sample period (e.g. first quartile) and in the other extreme quartile during the following period (e.g. fourth quartile) would count erroneously as a persistent extreme return, since it falls within the subclass of extreme returns in both periods. To avoid such spurious indications of persistence, we performed separate persistence tests on the four quartile groups and then consolidated the results for the extreme quartiles and for the moderate quartiles. This also allowed us to test for persistence homogeneity within the classes of moderate and extreme returns, see Young and Graff [1997a] for discussion.

6 We chose quartiles over other percentile divisions in order to enhance the sensitivity of the test by maximizing the number of samples within each percentile grouping.

groups) that would otherwise not have been expected solely on the basis of the quartile group definitions.[7]

To determine whether quartile performance is serially dependent, we calculate confidence intervals for the binomial distribution under the assumption that the probability of repetitive quartile performance is 25% during the test period.[8] The sample statistic is the percentage of returns for which the quartile rank of the asset return in the sample period is equal to the quartile rank of the asset return in the immediately following period. The critical question is whether or not the sample statistic is statistically distinct from 25%.[9]

Test Results

The key determinant of serial persistence in REIT returns throughout the test interval is sample frequency: annual returns, quarterly returns, and monthly returns displayed qualitatively distinct forms of persistence behavior that differ from one another too much to be a result of sampling error. Furthermore, persistence behavior for each sample frequency remains consistent as the data set is decomposed by subinterval or market capitalization. For these reasons, test results are grouped into three exhibits according to sample frequency: Exhibit 2 for annual returns, Exhibit 3 for quarterly returns, and Exhibit 4 for monthly returns.[10]

Exhibit 2 shows that annual returns display statistically significant sample persistence in the extreme returns in four out of five tests, while sample persistence statistics are indistinguishable from 25% for the moderate returns in each of the five tests. This is the same qualitative serial persistence behavior observed by Young and Graff [1997a, b] for annual appraisal-based returns from the NCREIF data base, suggesting that annual transaction-based REIT returns (but not quarterly or monthly REIT returns that are the subject of Exhibits 3 and 4) contain a component that tracks the qualitative performance of underlying real estate assets relative to the universe of privately held institutional real estate.

Exhibit 2 also shows that serial persistence within extreme returns appears to have been greater during the interval 1987-1992 than during the more recent interval 1993-1996. Evidence

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7 Even assuming the validity of the null hypothesis, size bias in the quartile groups of the monthly data sets perturbs the probability of serial persistence for each quartile rank slightly from its theoretical value of 25%, increasing the probability of serial persistence in the case of the 2nd Quartile and decreasing the probabilities of persistence slightly in the case of the other three quartiles. Accordingly, we examined the effect of perturbing the probability of serial persistence for each monthly quartile group to allow for empirically determined size bias. We found that the perturbation had virtually no effect on results for the extreme returns and only marginal effect on results for the moderate returns, cf. note 12 below.

8 The assumption that the persistence test statistic is binomially distributed is supported by results in Graff and Young [1996], Young and Graff [1997a], and Graff and Webb [1997] in the case of privately held real estate. This provided the rationale for the assumption in the case of REITs, at least to the extent that REIT returns are believed to reflect returns from the underlying real estate portfolios. Support for this assumption is provided by the empirical results of this study.

9 For a complete explanation of the computational issues involved in the calculation of the confidence interval for the discrete binomial distribution see Young and Graff [1997a or b].

10 In the case of annual data, we did not further divide the large and small capitalization data sets temporally into subsets according to the two subintervals because the resulting sample sizes were too small. Although we did subdivide these data sets temporally in the cases of quarterly and monthly data, only the large capitalization case is shown, and only in the exhibit for monthly data because that was the only case to generate noteworthy results.

of serial persistence, although still present, is not as conclusive when data are divided into returns from large capitalization and small capitalization REITs.[11]

In stark contrast with results for annual returns, Exhibit 3 shows that persistence statistics in quarterly REIT returns are statistically indistinguishable from 25% in both the extreme returns and the moderate returns.

Exhibit 4 shows that serial persistence for monthly returns represents yet a third distinct type of behavior, qualitatively different from persistence behavior for the other two sampling frequencies. To begin with, the four statistically significant persistence ratios in the case of Panel A are all *below* 25%, and thus constitute evidence of *negative* serial persistence among extreme monthly returns. When broken down into contributions from the two test subintervals, negative persistence in extreme returns is seen to be due entirely to negative persistence in extreme returns from the more recent test subinterval. Similarly, when broken down into contributions from large and small capitalization REITs, negative persistence is seen to be due entirely to negative persistence in extreme returns from large capitalization REITs since the beginning of 1993, when institutional investors ratcheted upward their level of participation in the large capitalization segment of the REIT market.

By contrast, the test statistics for moderate monthly returns in Panel B hover around or slightly above the edge of statistical significance for positive persistence in all cases except for small capitalization REITs, where the test statistic is highly significant. The exceptionally significant test statistic in the case of small capitalization REITs can be explained by noticing that in the case of inactively traded small capitalization stocks, stock prices are determined by a small number of designated institutional market makers from a potential trading range within which investor supply and demand pressure remains essentially constant. Market makers for such stocks have an economic incentive to maintain constant buy and sell prices in the absence of significant incremental investment information that might alter the trading range, because their stock inventories are financed by callable short-term loans collateralized primarily by inventory market value. This behavior of market makers is most pronounced in monthly returns because at least two-thirds of monthly stock returns consist entirely of capital gains (dividends virtually never are declared more than once per quarter). Constant prices translate into a significant number of 0.00% monthly returns.

Because it is a virtual certainty that a 0.00% monthly return will fall within either the second or third quartile (and usually the same quartile in successive months), the probability of persistent quartile rankings for such monthly returns is closer to 67% than to 25%. This creates upward pressure on monthly persistence test statistics for moderate returns, primarily in the case of the least actively traded smaller capitalization issues. Accordingly, the borderline aggregate significance of serial persistence for moderate monthly returns can be understood as the average effect of a high probability of serial persistence for a number of small capitalization REIT issues and serial independence for most moderate monthly REIT returns.[12]

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[11] Weaker evidence of serial persistence for annual returns than for monthly returns should not be viewed as evidence that serial persistence is actually weaker in the annual case, but rather as a limitation imposed on persistence detection by the relatively meager quantity of annual return data–732 annual returns in Exhibit 2, versus 1,855 quarterly returns in Exhibit 3, and 4,125 monthly returns in Exhibit 4.

[12] A potential source of distortion in the significance of persistence test statistics is the uneven weighting of the sample quartiles discussed in note 7. In the case of moderate monthly returns, upward perturbation of the probability of serial persistence to reflect empirically determined sample size bias

The Bottom Line for Investors

Serial persistence is observed in extreme annual REIT returns during the test interval, but not in moderate annual REIT returns. The same persistence behavior is observed in annual returns in the case of privately held real estate by Young and Graff [1997a, b]. When combined with the results of the present study, this suggests that annual REIT returns contain a component that tracked the qualitative performance of underlying real estate assets during the test interval.

Test results for the subintervals 1987-1992 and 1993-1996 imply that tracking noise increased during the more recent subinterval, as institutional investors began looking to REITs as an alternative vehicle for real estate investments. This suggests that increased institutional investment activity is forcing REIT return behavior to diverge increasingly from the returns on underlying REIT real estate portfolios, and to take on more of the behavioral characteristics of the stock market in general.

This conclusion is confirmed by the pattern of persistence observed in monthly REIT returns. Extreme monthly returns display highly significant negative persistence shown to be due entirely to the contribution of large capitalization REITs during the subinterval 1993-1996. In contrast, moderate monthly returns display only marginal persistence that is a likely consequence of a slight size bias in favor of the set of moderate returns. Keeping in mind the institutional investor preference for large capitalization REITs, we believe the highly significant persistence results of extreme monthly returns since 1992 can only be interpreted as the effect of institutional investors moving into and out of the same large capitalization REITs en masse.

Although positions acquired or liquidated by any single institutional investor might not be large enough to produce a noticeable effect on transaction prices, the combined effects of several institutional investors attempting roughly simultaneous transactions in the same REIT issues can be sufficient to drive the price of REIT shares temporarily up (or down) when the investors acquire (or liquidate) positions in large capitalization REITs during the same short interval. This creates upward (or downward) bias in the capital gains components that can easily drive monthly returns on the targeted REITs into the extreme quartiles. In the subsequent month, returns from these REITs will be subject to a corresponding bias in the opposite direction as supply and demand for the targeted REIT shares are restored to more normal levels and prices adjust accordingly.

This implies that the probability of serial persistence in monthly REIT returns is less than 25% whenever REITs are subjected to transaction pressure from institutional investors, and that most of the pressure will be observed in extreme returns. Because large capitalization REITs are the primary object of institutional investor interest, negative persistence in extreme returns is observed in large capitalization REITs but not in small capitalization ones. Because the current wave of institutional investor interest in large capitalization REITs surged in earnest around 1993, it follows that negative persistence in extreme monthly returns is observed in large capitalization REITs during the more recent sample subinterval 1993-1996, but not during the earlier subinterval 1987-1992.

Thus the main conclusion is that annual REIT returns ceased to reflect the qualitative behavior of returns on their underlying real estate portfolios precisely when the REITs began to attract significant institutional investor interest. Furthermore, the results for monthly returns

reduces the number of statistically significant persistence test samples from four to two. In no other case would this adjustment transform any test result from statistically significant to statistically insignificant.

suggest that, during the more recent test subperiod 1993-1996, institutional investors moved in and out of large capitalization REITs in ways that negatively impacted their overall returns. The inference that could be drawn by institutional investors is that the promise of superior liquidity and efficient real estate pricing via large capitalization REITs has been largely unfulfilled to date.

Investor behavior in the absence of complete information about market opportunities is investigated by Grossman and Stiglitz [1976]. The study concludes that investment analysts find it difficult to develop divergent opinions in the absence of information and that investors tend to behave more and more alike as investment information becomes more restricted.

The problem with REIT investing suggested by the present study is that institutional investors tend to act in concert. This can be attributed to industry-wide constraints on availability of hard investment information about REIT real estate portfolios from which investment analysts develop recommendations and on which institutional investors must base investment decisions.[13] When combined with the results of Exhibit 4, this suggests that recent institutional investment returns from REITs have been subject to lack-of-information penalties at both acquisition and disposition of the securities in a statistically significant fraction of transactions. Acquisition penalties arise when institutional investors decide roughly simultaneously to acquire positions in a REIT issue, and group-think leads to a demand-driven imbalance in the supply-and-demand equilibrium that temporarily drives up the price of the issue. The incremental acquisition cost can be viewed as a penalty deducted from the initial monthly return of the purchasers for failure to develop a diversity of opinion. Similarly, when institutional investors decide roughly simultaneously to cut back their positions in a REIT issue, a supply-driven imbalance in the supply-and-demand equilibrium leads to an analogous penalty deducted from the final monthly return of the sellers.

Serial persistence in asset return series should be statistically insignificant whenever sufficient information is available to enable investors to price individual assets according to diverse individual investment objectives. In the case of securities markets, adequate investment information leads to efficient price discovery and enhanced asset liquidity. The monthly persistence results in this study, however, imply that such price discovery is deficient in the REIT market.[14]

We believe that more information about underlying real estate assets will improve price discovery in the REIT market. There are policy implications here for institutional investors. Armed with the results of this study, institutional investors are in a position to demand improvements in the quantity and quality of fundamental information about REIT real estate assets, since this investor group now represents a major ownership interest in the REIT market. In any case, some improvement in the flow of publicly available investment information is almost certainly a necessary prerequisite to efficiency in the REIT market, and, depending upon the degree of improvement, we believe that it could be sufficient as well.

[13] This suggests in turn that there may be insufficient information about underlying real estate portfolios to alert REIT investors to the imposition of excessive agency costs, cf. Graff and Webb [1997] for an investigation of this question in the case of indirect investments in privately held real estate.

[14] The positive persistence in annual return data in Exhibit 2, which mimic the persistence in annual returns observed by the authors in the private real estate market, are also evidence of pricing inefficiency in the REIT market, since pricing efficiency implies that no persistence of any sort should be observable in return data for any sampling frequency. We assume that the positive persistence observed in the annual return data and the negative persistence observed in the monthly return data reflect different manifestations of the same economic source for REIT pricing inefficiency.

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Exhibit 1
Number of REITs
with Monthly Data as of January

Year	No. of REITs
1996	145
1995	149
1994	100
1993	68
1992	64
1991	58
1990	58
1989	58
1988	55
1987	48

Exhibit 2
Annual Equity REIT Return Persistence

Data Set	No. of Samples	No. of Successes	% of Successes	95% Conf. Interval
Panel A: Extreme Returns				
All REITs, 1987 to 1996	361	127	35.2 * * *	(20.4,29.8)
All REITs, 1993 to 1996	188	63	33.5 *	(18.9,31.6)
All REITs, 1987 to 1992	141	60	42.6 * * * *	(17.4,33.0)
Large Cap REITs, 1987 to 1996	154	44	28.6	(17.9,32.1)
Small Cap REITs, 1987 to 1996	151	52	34.4 *	(18.2,32.1)
Panel B: Moderate Returns				
All REITs, 1987 to 1996	371	103	27.8	(20.6,29.5)
All REITs, 1993 to 1996	195	53	27.2	(18.7,31.5)
All REITs, 1987 to 1992	145	43	29.7	(17.6,32.8)
Large Cap REITs, 1987 to 1996	166	44	26.5	(18.4,32.2)
Small Cap REITs, 1987 to 1996	156	47	30.1	(18.3,32.4)

* statistically distinct from 25% with 95% confidence
* * statistically distinct from 25% with 99% confidence
* * * statistically distinct from 25% with 99.99% confidence
* * * * statistically distinct from 25% with 99.999% confidence

Exhibit 3
Quarterly Equity REIT Return Persistence

Data Set	No. of Samples	No. of Successes	% of Successes	95% Conf. Interval
Panel A: Extreme Returns				
All REITs, 1987.1 to 1996.4	1611	388	24.1	(22.9,27.2)
All REITs, 1993.1 to 1996.4	921	206	22.4	(22.2,27.9)
All REITs, 1987.1 to 1992.4	658	174	26.4	(21.7,28.3)
Large Cap REITs, 1987.1 to 1996.4	874	204	23.3	(22.1,28.0)
Small Cap REITs, 1987.1 to 1996.4	668	161	24.1	(21.6,28.4)
Panel B: Moderate Returns				
All REITs, 1987.1 to 1996.4	1638	442	27.0	(22.9,27.1)
All REITs, 1993.1 to 1996.4	934	247	26.4	(22.2,27.9)
All REITs, 1987.1 to 1992.4	672	189	28.1	(21.7,28.3)
Large Cap REITs, 1987.1 to 1996.4	922	245	26.6	(22.2,27.8)
Small Cap REITs, 1987.1 to 1996.4	689	190	27.6	(21.7,28.4)

* statistically distinct from 25% with 95% confidence
** statistically distinct from 25% with 99% confidence
*** statistically distinct from 25% with 99.99% confidence
**** statistically distinct from 25% with 99.999% confidence

Exhibit 4
Monthly Equity REIT Return Persistence

Data Set	No. of Samples	No. of Successes	% of Successes	95% Conf. Interval
Panel A: Extreme Returns				
All REITs, Jan 1987 to Dec 1996	*4977*	*1123*	*22.6* * * *	*(23.8,26.2)*
All REITs, Jan 1993 to Dec 1996	*2921*	*621*	*21.3* * * * *	*(23.4,26.6)*
All REITs, Jan 1987 to Dec 1992	2022	495	24.5	(23.1,26.9)
Large Cap REITs, Jan 1987 to Dec 1996	*2964*	*628*	*21.2* * * * *	*(23.4,26.6)*
Small Cap REITs, Jan 1987 to Dec 1996	1904	457	24.0	(23.0,27.0)
Large Cap REITs, Jan 1993 to Dec 1996	*2051*	*416*	*20.3* * * * *	*(23.1,26.9)*
Large Cap REITs, Jan 1987 to Dec 1992	897	211	23.5	(22.1,27.9)
Panel B: Moderate Returns				
All REITs, Jan 1987 to Dec 1996	5179	1395	26.9 * *	(23.8,26.2)
All REITs, Jan 1993 to Dec 1996	3041	836	27.5 * *	(23.5,26.6)
All REITs, Jan 1987 to Dec 1992	2104	550	26.1	(23.1,26.9)
Large Cap REITs, Jan 1987 to Dec 1996	3144	854	27.2 *	(23.5,26.5)
Small Cap REITs, Jan 1987 to Dec 1996	2069	600	29.0 * * *	(23.1,26.9)
Large Cap REITs, Jan 1993 to Dec 1996	2120	569	26.8	(23.1,26.9)
Large Cap REITs, Jan 1987 to Dec 1992	1008	280	27.8 *	(22.3,27.7)

* statistically distinct from 25% with 95% confidence
* * statistically distinct from 25% with 99% confidence
* * * statistically distinct from 25% with 99.99% confidence
* * * * statistically distinct from 25% with 99.999% confidence
Figures in *italics* indicate negative persistence, i.e. sample persistence significantly less than 25%